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- (54) Thiazole derivative and leukotriene antagonist containing the same as the effective ingredients.

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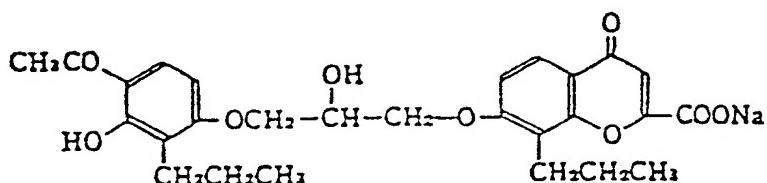
**Description****BACKGROUND OF THE INVENTION**

5 This invention relates to a novel thiazole derivative having leukotriene antagonistic action and a leukotriene antagonist containing the same as the active ingredient.

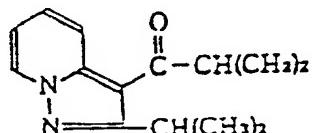
For prophylaxis or therapy of allergic diseases, there are the method which inhibits liberation of the mediator of anaphylaxis and the method which permits an antagonist to act on the mediator liberated. Disodium cromoglycate [The Merck Index, ninth edition 2585 (1976)] and Tranirast [Journal of Japanese

10 Pharmacology, 74, 699 (1978)] are typical drugs belonging to the former and those belonging to the latter may include drugs antagonistic to histamine which is one of the mediators of allergic reactions such as diphenhydramine, chlorophenylamine, astemizole, terfenadine, clemastine, etc., as well known drugs. However, a substance which cannot be antagonized with an anti-histamine agent, namely SRS (Slow Reacting Substance) has been suggested to be liberated from the lung of a bronchial asthma patient [Progr. Allergy, 6, 539 (1962)], and recently these SRS [leukotriene C<sub>4</sub>(LTC<sub>4</sub>), leukotriene D<sub>4</sub>(LTD<sub>4</sub>) and leukotriene E<sub>4</sub>(LTE<sub>4</sub>)] are comprehensively called SRS [Proc. Natl. Acad. Sci. U.S.A., 76, 4275 (1979) and 77, 2014 (1980); Nature, 285, 104 (1980)] and considered as the important factor participating in human asthma attack [Proc. Natl. Acad. Sci. U.S.A., 80, 1712 (1983)].

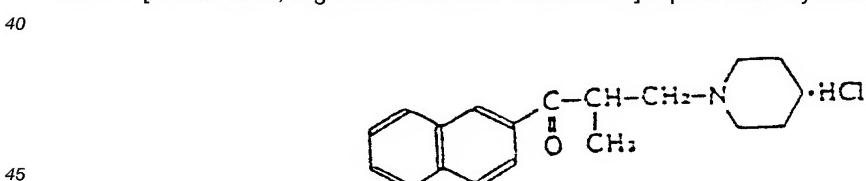
Some leukotriene antagonists have been known in patents or literatures. For example, there have been  
20 known FPL-55712 [Agents and Actions, 9, 133 (1979)] represented by the following formula:



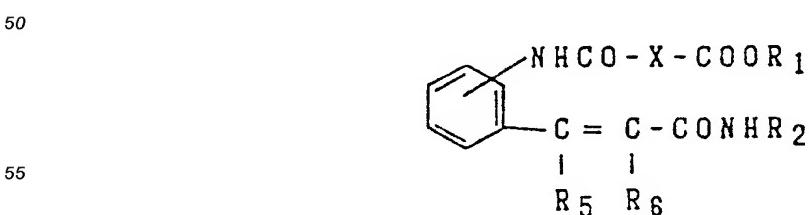
30 KC-404 [Jap. J. Pharm., 33, 267 (1983)] represented by the following formula:



KZ-111 [Chem. Abst, registration number 72637-30-0] represented by the following formula:

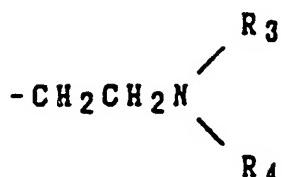


and the compound represented by the following formula (U.S. Patent No. 4,296,129):



wherein R<sub>1</sub> represents a hydrogen atom, an alkyl group having 1 to 4 carbon atoms or a group represented by the following formula:

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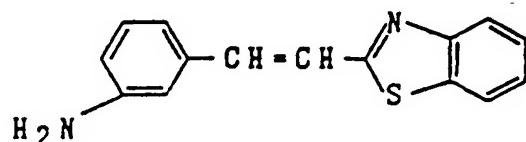
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(wherein R<sub>3</sub> and R<sub>4</sub> each represent an alkyl group having 1 to 3 carbon atoms); R<sub>2</sub> represents an alkyl group having 8 to 15 carbon atoms or a cycloalkyl group having 6 to 12 carbon atoms; R<sub>5</sub> and R<sub>6</sub> each represent a hydrogen atom or a methyl group. However, none of these have been clinically applied.

On the other hand, of the thiazole derivatives, as the compounds in which the 2-position of thiazole and the phenyl group are bonded through 2 to 4 atoms, there have been known a large number of compounds such as the compound (Japanese Unexamined Patent Publication No. 22460/1973) represented by the formula:

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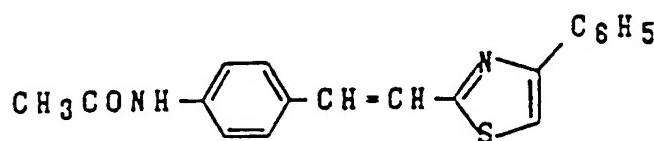
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the compound represented by the following formula [Farmaco. Ed. Sci, 21, 740 (1966)]:

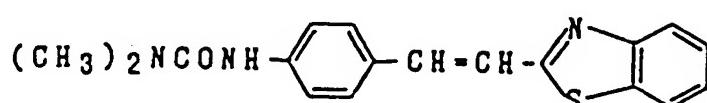
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the compound represented by the following formula (German Patent No. 31 48 291):

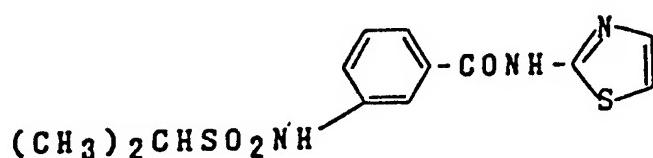
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and the compound represented by the following formula (Japanese Unexamined Patent Publication No. 16871/1984):

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However, in any of these literatures or patents, nothing is mentioned about the leukotriene antagonistic action.

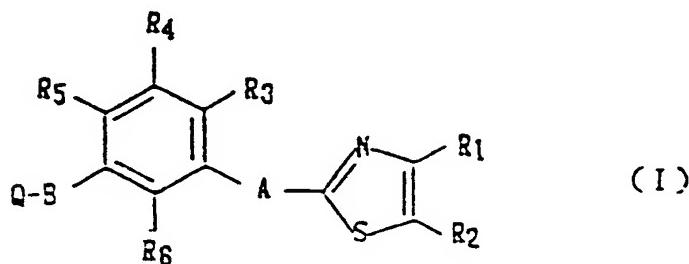
The present inventors have sought after compounds having antagonistic action to leukotriene and effective as the therapeutical medicine for various diseases caused by leukotriene, and consequently found that a novel thiazole derivative has excellent leukotriene antagonistic action to accomplish the present invention.

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### SUMMARY OF THE INVENTION

The thiazole derivative of the present invention is a compound represented by the following formula (I):

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wherein R<sub>1</sub> and R<sub>2</sub> each independently represent a hydrogen atom, an alkyl group having 1 to 8 carbon atoms, a lower alkoxy carbonyl group or a substituted or unsubstituted phenyl group or taken together represent a tetramethylene group corresponding to a fused cyclohexane ring or a butadienylene group which is unsubstituted or substituted with a halogen atom, a lower alkoxy group, a lower alkoxy carbonyl group or an alkyl group having 1 to 3 carbon atoms corresponding to a fused benzene ring; R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> and R<sub>6</sub> each independently represent a hydrogen atom, a hydroxyl group, a lower alkoxy group, an alkyl group having 1 to 3 carbon atoms or a halogen atom; A represents a linking group having 2 to 4 chain members; B represents a linking group having 2 to 5 chain members; and Q represents a carboxyl group, a lower alkoxy group, a hydroxyl group, an alkoxy carbonyl group having 2 to 6 carbon atoms or a 5-tetrazolyl group.

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### DETAILED DESCRIPTION OF THE INVENTION

In the above formula (I), the alkyl group having 1 to 3 carbon atoms may include methyl, ethyl, propyl and isopropyl. The alkyl group having 1 to 8 carbon atoms may include, in addition to the alkyl groups having 1 to 3 carbon atoms as mentioned above, straight and branched aliphatic groups having 4 to 8 carbon atoms such as butyl, isobutyl, sec-butyl, t-butyl, amyl, isoamyl, sec-amyl, sec-isoamyl (1,2-dimethylpropyl), t-amyl (1,1-dimethylpropyl), hexyl, isoheptyl (4-methylpentyl), sec-hexyl (1-methylpentyl), 2-methylpentyl, 3-methylpentyl, 1,1-dimethylbutyl, 2,2-dimethylbutyl, 3,3-dimethylbutyl, 1,2-dimethylbutyl, 1,3-dimethylbutyl, 1,2,2-trimethylpropyl, heptyl, isoheptyl (5-methylhexyl), 2,2-dimethylpentyl, 3,3-dimethylpentyl, 4,4-dimethylpentyl, 1,2-dimethylpentyl, 1,3-dimethylpentyl, 1,4-dimethylpentyl, 1,2,3-trimethylbutyl, 1,1,2-trimethylbutyl, 1,1,3-trimethylbutyl, octyl, iso-octyl (6-methylheptyl), sec-octyl (1-methylheptyl) and t-octyl (1,1,3,3-tetramethylbutyl) group, etc. The lower alkoxy group may include straight and branched alkoxy groups having 1 to 3 carbon atoms such as methoxy, ethoxy, propoxy and isopropoxy group, etc.

The lower alkoxy carbonyl group may include straight and branched alkoxy carbonyl groups having 2 to 4 carbon atoms such as methoxycarbonyl, ethoxycarbonyl, propoxycarbonyl and isopropoxycarbonyl group. The alkoxy carbonyl group having 2 to 6 carbon atoms may include, in addition to the lower alkoxy carbonyl group as mentioned above, alkoxy carbonyl groups having 5 to 6 carbon atoms such as butoxycarbonyl group and amyloxy carbonyl group and isomer-substituted groups of these. Examples of the halogen atom may include fluorine atom, chlorine atom, bromine atom and iodine atom. As the substituent on the substituted phenyl group in the definition of R<sub>1</sub> and R<sub>2</sub>, there may be employed, for example, the alkyl group having 1 to 3 carbon atoms, lower alkoxy group, lower alkoxy carbonyl group and halogen atom as mentioned above. As the linking group in the definition of A, any group having 2 to 4 atoms as the chain member constituting the linking group may be used, but it should particularly preferably contain carbon atom, oxygen atom, and nitrogen atom. Examples of such a linking group may include -CH=CH-, -CH<sub>2</sub>CH<sub>2</sub>-, -OCH<sub>2</sub>-, -NHCH<sub>2</sub>-, -CONH-, -CH=CH-CONH-, -CH<sub>2</sub>OCH<sub>2</sub>-, more preferably -CH=CH-, -CH<sub>2</sub>CH<sub>2</sub>-.

As the linking group in the definition of B, any group having 2 to 5 atoms in the chain group constituting the linking group may be used, but it should particularly preferably contain carbon atom, oxygen atom and nitrogen atom.

atom. Examples of such a linking group may include

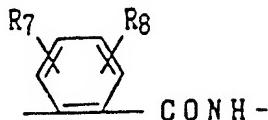
$-(\text{CH}_2)_n\text{-CONH-}$  (wherein  $n$  represents an integer of 0-3),

$-(\text{CH}_2)_n\text{-NH-}$  (wherein  $n$  represents an integer of 1-4),

$-(\text{CH}_2)_n\text{-O-}$  (wherein  $n$  represents an integer of 1-4),

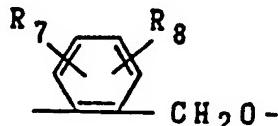
5     $-(\text{CH}_2)_n\text{-}$  (wherein  $n$  represents an integer of 2-5),

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(wherein  $R_7$  and  $R_8$  each independently represent a hydrogen atom or an alkyl group having 1 to 3 carbon atoms as defined above),

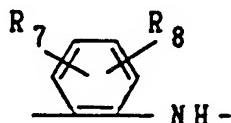
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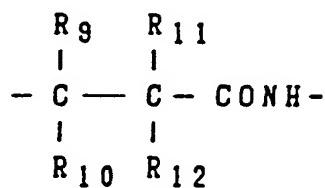
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(wherein  $R_7$  and  $R_8$  have the same meanings as defined above),

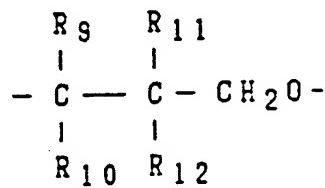
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(wherein  $R_9$ ,  $R_{10}$ ,  $R_{11}$  and  $R_{12}$  each independently represent a hydrogen atom, a phenyl group or an alkyl group having 1 to 6 carbon atoms),

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EP 0 219 436 B1

(wherein R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> and R<sub>12</sub> have the same meanings as defined above),



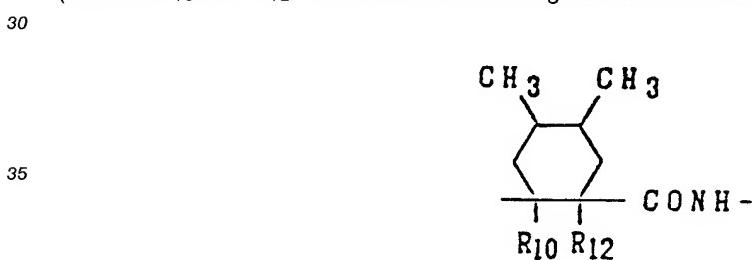
(wherein R<sub>9</sub> and R<sub>11</sub> have the same meanings as defined above),



(wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above),



(wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above),



40 (wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above),

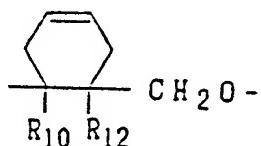


50 (wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above),



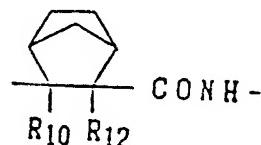
(wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above),

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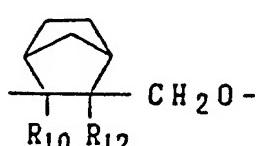
10 (wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above),

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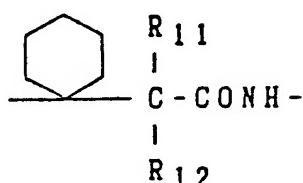
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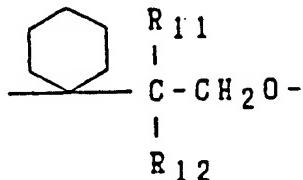
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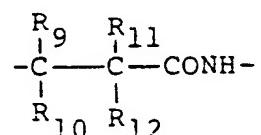
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50 (wherein R<sub>11</sub> and R<sub>12</sub> have the same meanings as defined above), more preferably

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(wherein R<sub>11</sub> and R<sub>12</sub> each represent a hydrogen atom and R<sub>9</sub> and R<sub>10</sub> each independently represent an alkyl group having 1 to 6 carbon atoms).

The thiazole derivative of the present invention is not limited to a specific isomer, but includes all of geometric isomers, steric isomers, optical isomers and their mixtures such as racemic mixture.

5 The thiazole derivative of the present invention can be synthesized according to various methods.

For example, in the above formula (I), the compound wherein the linking group B is bonded through a nitrogen atom to the benzene ring can be synthesized according to the synthetic routes [A]-[C].

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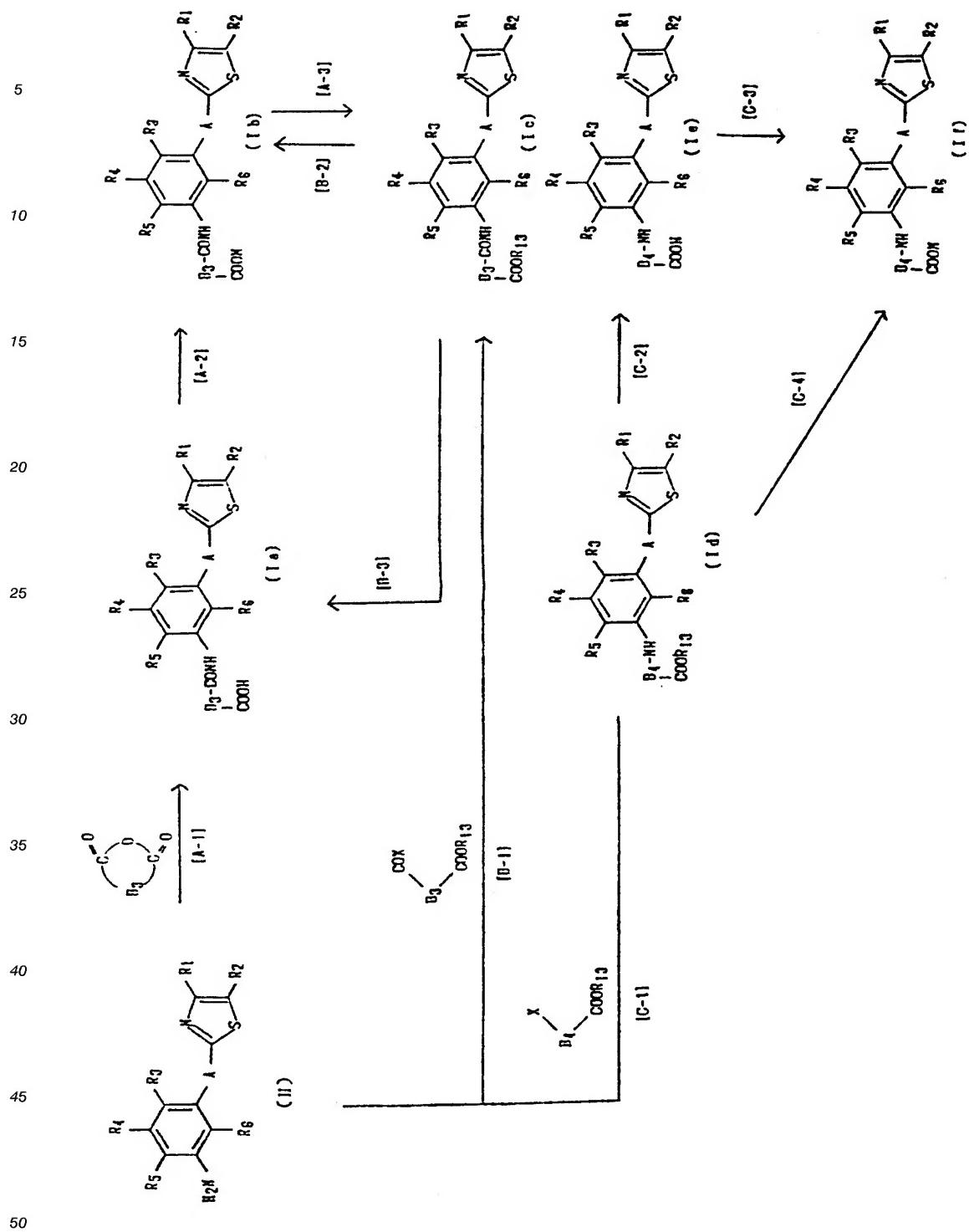
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In the synthetic routes, R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub> and A have the same meanings as defined above, B<sub>3</sub> represents a direct bond or a linking group having 1 to 3 chain members, B<sub>4</sub> represents a linking group having 1 to 4 chain members, M represents an alkali metal atom, X represents a halogen atom and R<sub>13</sub> represents an alkyl group having 1 to 5 carbon atoms.

The aniline derivative (II) used as the starting material can be synthesized according to the known method [Tetrahedron Letters, 25, 839 (1984)].

In the synthetic route [A], the aniline derivative (II) is allowed to react with 0.8 to 2 equal amounts of a cyclic acid anhydride to obtain the compound (Ia) (step [A-1]). As the reaction solvent, there may be employed aromatic hydrocarbons such as toluene, benzene, etc.; ether type solvent such as ethyl ether, dioxane, tetrahydrofuran, etc.; halogenated hydrocarbons such as chloroform, dichloromethane, etc. This

- 5 reaction may be practiced at a temperature from under ice-cooling to the boiling point of the solvent, particularly preferably from room temperature to 60 °C. The compound (Ia) can be converted to an alkali metal salt (Ib) by the reaction with a carbonate, a hydrogen carbonate or a hydroxide of the corresponding alkali metal in a hydrous alcoholic solvent (step [A-2]). Further, the compound (Ib) can be allowed to react with 1 to 3 equivalents of an alkylating agent such as an alkyl halide or an alkyl sulfonate, etc., in a non-protonic polar solvent such as dimethyl sulfoxide, dimethylformamide, hexamethylphosphoramide triamide, etc., at 0 to 100 °C to be alkylated and converted to a carboxylic acid ester (Ic) (step [A-3]).

In the synthetic route [B], the compound (II) can be acylated by the reaction with a carboxylic acid monoester monohalide in the presence of an organic base such as pyridine, triethylamine, etc., or an inorganic base such as potassium carbonate, sodium hydrogen carbonate, etc., at 0-100 °C to synthesize

- 15 the compound (Ic) (step [B-1]). As the reaction solvent, there may be used aromatic hydrocarbons, ether type solvents, halogenated hydrocarbons or non-protonic polar solvents. The compound (Ic) can be hydrolyzed in a conventional manner in a hydrous alcoholic solvent with an alkali metal type inorganic base such as sodium hydroxide, potassium carbonate, etc., to be readily converted to the compound (Ib) (step [B-2]). Also, after the above hydrolysis, the product can be treated with a mineral acid to obtain a free

20 carboxylic acid (Ia) (step [B-3]).

In the synthetic route [C], the compound (II) can be allowed to react with a  $\omega$ -halocarboxylic acid ester in the presence of an organic base such as triethylamine, pyridine, etc., in an aromatic hydrocarbon type, ether type or halogenated hydrocarbon type solvent at a temperature from 0 °C to the boiling point of the solvent to effect N-alkylation and result in synthesis of the compound (Id) (step [C-1]). The compound (Ie)

- 25 can be synthesized according to the same method as in the step [B-3] (step [C-2]), and the compound (If) can be synthesized in the same manner as in the step [A-2] or the step [B-2] (step [C-3], step [C-4]).

In the above formula (I), the compound wherein the linking group B is bonded through an oxygen atom to the benzene ring can be synthesized according to the synthetic route [D] shown below.

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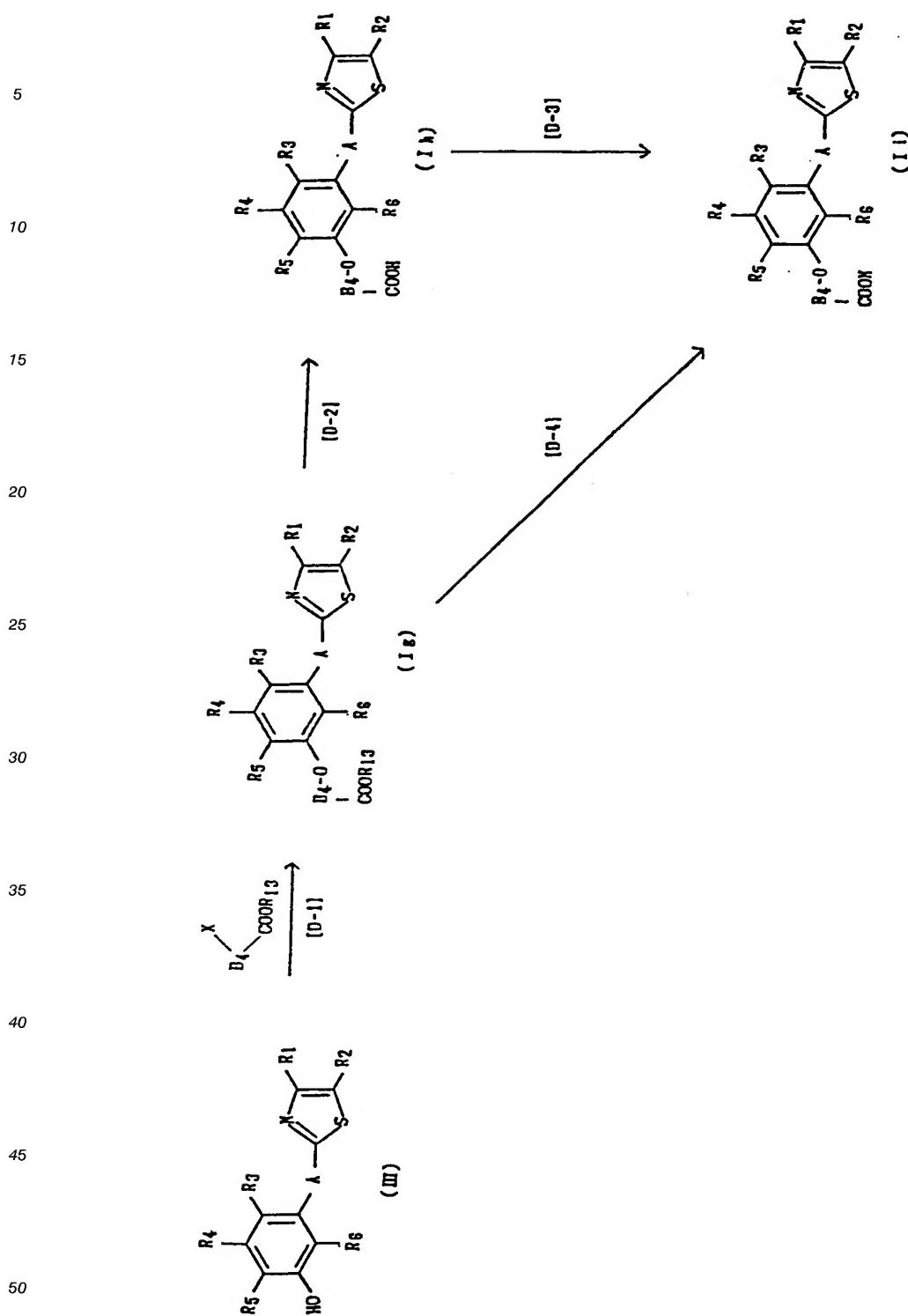
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In the above synthetic route, R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>13</sub>, A, B<sub>4</sub>, M and X have the same meaning as defined above.

The phenol derivative (III) used as the starting material can be synthesized according to the known method [Journal of Medicinal Chemistry, 25, 1378 (1982)].

By O-alkylation of the compound (III) with a  $\omega$ -halocarboxylic acid ester in a solvent of ketone type such as acetone, methyl ethyl ketone, etc., or alcohol type, in the presence of an inorganic base such as potassium carbonate, sodium hydrogen carbonate, etc., at a temperature from 0 °C to the boiling point of the solvent, the phenylether compound (Ig) can be synthesized (step [D-1]). The compound (Ih) can be obtained from the compound (Ig) similarly as in the step [B-2] (step [D-2]), and the compound (II) can be obtained from the compound (Ih) according to the same method as in the step [A-2] (step [D-3]), or from the compound (Ig) in the same manner as in the step [B-2] (step [D-4]).

In the above formula (I), the compound when the linking group A is a vinylene group can be synthesized according to the synthetic route [E] shown below.

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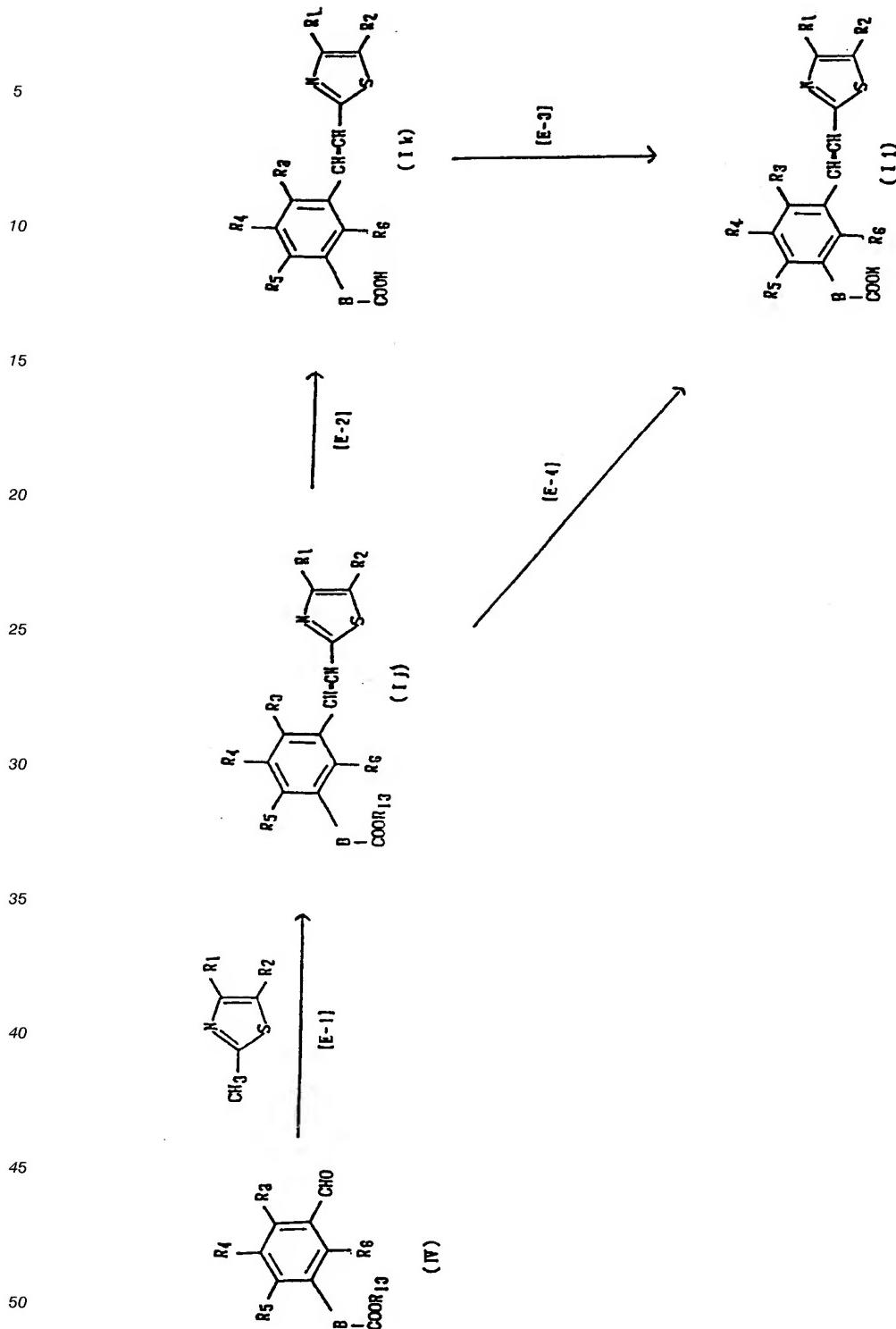
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In the above synthetic route, R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>13</sub>, B and M have the same meanings as defined above. The benzaldehyde derivative [IV] used as the starting material can be synthesized according to the known method [Journal of Medicinal Chemistry, 25, 1378 (1982)].

The compound (Ij) can be obtained according to the dehydrating condensation reaction by heating the benzaldehyde derivative (IV) and a 2-methylthiazole in acetic anhydride under nitrogen gas stream to 100-

200 °C (step [E-1]). Hydrolysis of the compound (Ij) in the same manner as in the step [B-3] gives the compound (Ik) (step [E-2]). From the compound (Ik), an alkali metal salt (Il) can be obtained in the same manner as in the step [A-2] (step [E-3]). The alkali metal salt (Il) can be obtained also by treating similarly the compound (Ij) as in the step [B-2] (step [E-4]).

5 The compound (I) or the present invention is characterized by having a marked leukotriene antagonistic action.

More specifically, when the antagonistic action to SRS was tested in vitro by use of an extirpated ileum of a guinea pig for the compound of the present invention, it has been found to have a selective antagonistic action for SRS even at an extremely low concentration. When further detailed LTD<sub>4</sub> antagonistic test was conducted by use of a guinea pig for some of the compounds of the present invention which have exhibited strong action in vitro test, it has been found that they can inhibit remarkably the asthmatic symptoms induced by LTD<sub>4</sub>.

The leukotriene antagonist of the present invention contains the compound represented by the above formula (I) or its pharmaceutically acceptable salt as the active ingredient together with a solid or liquid carrier or diluent for medicine, namely additives such as excipients, stabilizers, etc. When the compound (I) has a carboxylic group, preferable salts are non-toxic salts which are pharmaceutically acceptable such as alkali metal salts and alkaline earth metal salts such as sodium salts, potassium salts, magnesium salts, calcium salts or aluminum salts. It is similarly preferable to use adequate non-toxic amine salts such as ammonium salts, lower-alkylamine [e.g. triethylamine] salts, hydroxy lower-alkylamine [e.g. 2-hydroxyethylamine, bis-(2-hydroxyethyl)amine, tris(hydroxymethyl)aminomethane or N-methyl-D-glucamine] salts, cycloalkylamine [e.g. dicyclohexylamine] salts, benzylamine [e.g. N,N'-dibenzylethylenediamine] salts and dibenzylamine salts. In view of the basicity of the thiazole ring of the compound (I) of the present invention, preferable salts may include non-toxic salts such as hydrochlorides, methanesulfonates, hydrobromides, sulfates, phosphates, fumarates, succinates, etc. These salts are water-soluble and hence most preferable when used for injections. In said leukotriene antagonist, the proportion of the active ingredient to the carrier component in therapy may be variable between 1 wt.% to 90 wt.%. The leukotriene antagonist may be administered orally in the dosage form such as granules, fine particles, powders, tablets, hard capsules, soft capsules, syrup, emulsion, suspension or solution, or alternatively administered intravenously, intramuscularly or subcutaneously as injections. Also, it can be used as topical administration preparation to rectum, nose, eye, lung in the dosage form such as suppository, collunarium, eye drops or inhalent. Further, it can be used in the form of powder for injection which is to be formulated when used. It is possible to use an organic or inorganic, solid or liquid carrier or diluent for medicine suitable for oral, rectal, parenteral or local administration for preparation of the leukotriene antagonist of the present invention. Examples of the excipient to be used in preparation of a solid preparation may include lactose, sucrose, starch, talc, cellulose, dextrin, kaolin, calcium carbonate, etc. Liquid preparations for oral administration, namely, emulsion, syrup, suspension, solution, etc., contain inert diluents generally employed such as water or vegetable oils, etc. These preparations can contain auxiliary agents other than inert diluents such as humectants, suspension aids, sweeteners, aromatics, colorants or preservatives. It may also be formulated into a liquid preparation which is contained in capsules of absorbable substances such as gelatin. As the solvent or suspending agent to be used for production of preparations for parenteral administration, namely injections, suppositories, collunarium, eye drops, inhalent, etc., there may be employed, for example, water, propylene glycol, polyethylene glycol, benzyl alcohol, ethyl oleate, lecithin, etc. As the base to be used for suppository, there may be included, for example, cacao fat, emulsified cacao fat, laurine fat, Witepp sol, etc. The preparations can be prepared according to conventional methods.

45 The clinical dose, when used by oral administration, may be generally 0.01 to 1000 mg/day as the compound of the present invention for human adult, preferably 0.01 to 100 mg, but it is more preferable to increase or decrease suitably the dose depending on the age, condition of disease and symptoms. The above mentioned dose per day of the leukotriene antagonist may be administered once per day or in 2 or 3 divided doses per day at suitable intervals, or intermittently.

50 On the other hand, when used as an injection, it is preferable to administer continuously or intermittently 0.001 to 100 mg/administration as the compound of the present invention to human adult.

According to the present invention, a novel thiazole derivative having remarkable leukotriene antagonistic action can be provided. Said thiazole derivative is useful as the leukotriene antagonist for prophylaxis and therapy of various diseases in which leukotriene participates.

55 The present invention is described in more detail by referring to Synthesis examples, Examples and Test examples, but these are not intended to limit the scope of the present invention at all. In Synthesis examples and Examples, the symbols of "IR", "TLC", "NMR" and "MS" represent "infrared-absorption spectrum", "thin layer chromatography", "nuclear magnetic resonance spectrum" and "mass analysis",

respectively, the proportion of the solvent written at the site of separation by chromatography indicating volume ratio, the solvent in the parenthesis of "TLC" indicating a developing solvent, "IR" being measured according to the KBr tablet method unless otherwise specifically noted, and the solvent in the parenthesis of "NMR" indicating the measurement solvent.

5

#### Synthesis example 1

##### Synthesis of 4-isopropyl-2-methylthiazole

10 To a solution of 25 g of 3-methyl-2-butanone dissolved in 174 ml of methanol, 15.8 ml of bromine was added dropwise while temperature of the reaction mixture was maintained within the range of 0 to 5 °C, and further the mixture was stirred at 10 °C for 1 hour. Then, 87 ml of water was added and the mixture was stirred at room temperature overnight. After completion of the reaction, the reaction mixture was extracted with ethyl ether, the extract was washed with 10% aqueous potassium carbonate solution and dried over calcium chloride, followed by evaporation of the solvent to give 53.2 g of a crude product of 1-bromo-3-methyl-4-butanone as colorless liquid. Further, without purification, 43.2 g of the above bromoketone was dissolved in 100 ml of ethanol and the solution was added at room temperature to a solution of 19.7 g of thioacetamide dissolved in 150 ml of ethanol. After the reaction was completed by refluxing for 2.5 hours, ethanol was evaporated under reduced pressure and the residue was ice-cooled to 20 precipitate crystals. The crystals are washed with ethyl ether, poured into 250 ml of an aqueous saturated sodium hydrogen carbonate solution, free bases were extracted with n-hexane, followed by drying over anhydrous magnesium sulfate and concentration under reduced pressure to give 27.1 g (yield 73%) of the title compound as pale brown liquid.

IR (film):  $\nu = 2950, 1510, 1450, 1165, 730 \text{ cm}^{-1}$

25 NMR ( $\text{CDCl}_3$ ):  $\delta = 1.30(6\text{H},\text{d}), 2.68(3\text{H},\text{s}), 3.07(1\text{H},\text{m}), 6.67(1\text{H},\text{s})$

#### Synthesis example 2

##### Synthesis of 4-isopropyl-2-(trans-3-nitrostyryl) thiazole

30 To 11.3 ml of acetic anhydride were added 29.0 g of 3-nitrobenzaldehyde and 27.1 g of 4-isopropyl-2-methylthiazole and the reaction was carried out under nitrogen gas stream at 170 °C for 23 hours. After completion of the reaction, low boiling materials were evaporated under reduced pressure and the residue was recrystallized from ethyl ether-n-hexane to give 16.8 g (yield 32%) of the title compound as yellowish 35 white crystals.

NMR ( $\text{CDCl}_3$ ):  $\delta = 1.34(6\text{H},\text{d}), 3.12(1\text{H},\text{m}), 6.86(1\text{H},\text{s}), 7.2-8.4(6\text{H},\text{m})$

IR:  $\nu = 1625, 1590, 1435, 1305, 1210, 945, 770 \text{ cm}^{-1}$

#### Synthesis example 3

##### Synthesis of 2-(3-nitrophenyl)methoxymethylbenzothiazole

A mixture of 1.60 g of 3-nitrobenzyl chloride, 1.3 g of 2-hydroxymethylbenzothiazole and 0.54 g of 45 potassium carbonate in 20 ml of acetone was stirred at room temperature for 1.5 hours and then refluxed for 30 minutes. After evaporation of acetone under reduced pressure, the residue was dissolved in ethyl acetate, washed with water and dried over magnesium sulfate, followed by evaporation of the solvent under reduced pressure. The residue was purified through a silica gel column chromatography by use of ethyl ether-n-hexane to obtain 1.7 g (yield 73%) of the title compound.

IR:  $\nu = 1520, 1340, 1090, 800, 766, 725 \text{ cm}^{-1}$

50 NMR ( $\text{CDCl}_3$ ):  $\delta = 4.65(2\text{H},\text{s}), 4.90(2\text{H},\text{s}), 7.1-8.2 (8\text{H},\text{m})$

#### Synthesis example 4

##### Synthesis of 2-[2-(3-hydroxyphenyl)ethyl]benzothiazole

55 A mixture of 6.0 g of 2-(trans-3-hydroxystyryl) benzothiazole and 0.5 g of 5% palladium-carbon in 80 ml of ethanol was stirred under hydrogen gas stream under normal pressure at 50 to 60 °C for 3 hours. After completion of the reaction, the catalyst was filtered off and the filtrate was evaporated under reduced

pressure to obtain 5.5 g (yield 92%) of the title compound as pale gray crystals.

IR:  $\nu = 3050, 1580, 1480, 1280, 760 \text{ cm}^{-1}$   
 m.p.: 129-130 °C

5 Synthesis example 5

Synthesis of 2-(trans-3-hydroxystyryl)-4-ethyl-5-methylthiazole

An amount of 3.0 g of 2-(trans-3-aminostyryl)-4-ethyl-5-methylthiazole was added to 18 ml of 20%

10 hydrochloric acid and to the mixture was added dropwise slowly 3 ml of an aqueous solution of 0.86 g of sodium nitrite while maintaining the inner temperature at 4 to 5 °C. After the mixture was stirred at the above temperature for 1.5 hours, the reaction mixture was added into 50 ml of boiling water over 20 minutes. After the mixture was cooled to room temperature, the precipitates formed were collected by filtration, washed with aqueous saturated sodium hydrogen carbonate solution and with water, followed by 15 drying under reduced pressure. The crude product was washed with toluene and dried under reduced pressure to obtain 2.1 g (yield 70%) of the title compound.

m.p.: 161-162 °C  
 IR:  $\nu = 1620, 1598, 1575, 1215, 950, 778 \text{ cm}^{-1}$

20 Synthesis example 6

(1) Synthesis of 2-(trans-3-hydroxystyryl)benzothiazole

A mixture of 25 g of 3-hydroxybenzaldehyde, 36.6 g of 2-methylbenzothiazole, 38.8 ml of acetic

25 anhydride and 7.7 ml of formic acid was heated at 120 °C for 25 hours. The low boiling materials were evaporated together with toluene under reduced pressure, and the residue was added to 150 ml of methanol and refluxed with addition of 3 g of potassium carbonate for 1 hour. After cooled to room temperature, the mixture was filtered and filtrate was concentrated. The crude product formed was washed with methanol and ethyl ether and dried under reduced pressure to obtain 20.6 g (yield 40%) of the title 30 compound.

m.p.: 210-211 °C  
 IR:  $\nu = 1620, 1570, 1190, 1145, 935, 750 \text{ cm}^{-1}$

(2) The operation similar to (1) was conducted to obtain 2-(trans-3-hydroxystyryl)-4-phenylthiazole (yield 35 21%).

m.p.: 150-151 °C  
 IR:  $\nu = 3450, 1580, 1280, 950, 730 \text{ cm}^{-1}$

40 Synthesis example 7

Synthesis of ethyl 5-(3-cyanophenyl)-4-pentenoate

An amount of 0.66 g of 60% sodium hydride was added to 14 ml of anhydrous dimethyl sulfoxide and

45 the mixture was heated under nitrogen gas stream to 75 to 80 °C to form dimsyl anions. After cooled to room temperature, the mixture was added to a solution of 6.3 g of 3-ethoxycarbonylpropyltriphenylphosphonium bromide in 20 ml of anhydrous dimethyl sulfoxide. The mixture was stirred at room temperature for 5 minutes and a solution of 1.5 g of 3-cyanobenzaldehyde in 4 ml of anhydrous dimethyl sulfoxide, followed by stirring at room temperature for 1.5 hours. After completion of the 50 reaction, 5% hydrochloric acid was added to stop the reaction, and the reaction mixture was extracted with toluene. After evaporation of the solvent under reduced pressure, the residue was purified through silica gel column chromatography by use of ethyl ether-n-hexane to obtain 0.94 g (yield 36%) of the title compound as colorless oily product.

IR (film):  $\nu = 1725, 1245, 1180, 1150, 960, 785 \text{ cm}^{-1}$   
 55 NMR ( $\text{CCl}_4$ ):  $\delta = 1.25(3\text{H},\text{t}), 2.2-2.8(4\text{H},\text{m}), 4.09(2\text{H},\text{q}), 6.2-6.6(2\text{H},\text{m}), 7.3-7.7(4\text{H},\text{m})$

Synthesis example 8Synthesis of ethyl 5-(3-formylphenyl)pentanoate

5 An amount of 660 mg of ethyl 5-(3-cyanophenyl)-4-pentenoate and 60 mg of 5% palladium-carbon were added into 6 ml of ethanol and catalytic reduction was carried out under hydrogen gas stream at room temperature for 18 hours. After the catalyst was filtered off, the filtrate was evaporated under reduced pressure and 600 mg of the crude product was used for the subsequent reaction.

10 Into a suspension of 986 mg of anhydrous stannous chloride in anhydrous ethyl ether was introduced hydrogen chloride gas for 2 minutes to provide a uniform solution. Next, 600 mg of the above saturated carboxylic acid ester dissolved in 4 ml of ethyl ether was added and hydrogen chloride gas was introduced again for 1 minute, followed by stirring at room temperature for 5 hours. Subsequently, each 5 ml of ethyl ether and water was added and after stirred at room temperature for 1 hour, the organic layer was extracted with toluene. After drying over magnesium sulfate, the solvent was evaporated under reduced pressure and 15 the residue was purified through silica gel column chromatography by use of ethyl ether-n-hexane to give 460 mg (yield 68%) of the title compound as colorless oily product.

IR (film):  $\nu = 1725, 1690, 1440, 1365, 1235, 1180, 1020, 790 \text{ cm}^{-1}$

NMR ( $\text{CCl}_4$ ):  $\delta = 1.20(3\text{H},\text{t}), 1.4\text{-}1.9(4\text{H},\text{m}), 2.0\text{-}2.9(4\text{H},\text{m}), 4.5(2\text{H},\text{q}), 7.2\text{-}7.8(4\text{H},\text{m}), 9.88(1\text{H},\text{s})$

Synthesis example 9Synthesis of 2-[trans-3-(3-cyanopropylamino) styryl]benzothiazole

20 To 50 ml of toluene were added 2.02 g of triethylamine and 5.04 g of 2-(trans-3-aminostyryl)-25 benzothiazole at room temperature, and then 2.96 g of 4-bromobutyronitrile was added to carry out the reaction at 110 °C for 7 hours. After completion of the reaction, the reaction mixture was extracted with ethyl acetate. After evaporation of the solvent under reduced pressure, the residue was purified through silica gel column chromatography by use of ethyl acetate-ethyl ether-n-hexane (2 : 5 : 5) to give 2.55 g (yield 40%) of the title compound as colorless oily product.

30 m.p.: 97-98 °C

IR:  $\nu = 3400, 2250, 1600, 950, 760 \text{ cm}^{-1}$

Synthesis example 10Synthesis of 4-isopropyl-2-(trans-3-aminostyryl) thiazole

35 To a solution of 16.8 g of 4-isopropyl-2-(trans-3-nitrostyryl)thiazole dissolved in 60 ml of ethanol was added a solution of 48.4 g of stannous chloride dihydrate in 60 ml of ethanol and the mixture was refluxed for 1.5 hours. After the reaction mixture was cooled to room temperature, the mixture was adjusted to pH 13 40 with addition of 30% aqueous sodium hydroxide solution and then the basic portion was extracted with the use of ethyl acetate and dried over magnesium sulfate, followed by evaporation of the solvent under reduced pressure. The solid residue formed was recrystallized from ethyl ether-n-hexane to obtain 7.1 g (yield 47%) of the pale yellowish white title compound.

m.p.: 62-63 °C

45 IR:  $\nu = 3430, 3300, 1600, 1580, 960, 780, 740 \text{ cm}^{-1}$

NMR ( $\text{CDCl}_3$ ):  $\delta = 1.32(6\text{H},\text{d}), 2.90\text{-}3.4(1\text{H},\text{m}), 3.70(2\text{H},\text{s}), 6.5\text{-}7.3(7\text{H},\text{m})$

Synthesis example 11Synthesis of various thiazole derivatives

50 By carrying out the treatment similarly as in Synthesis example 10, various thiazole derivatives shown as Nos. 1-32 and 36-38 in Table 1 were obtained.

Synthesis example 12Synthesis of 2-[2-(3-aminophenyl)ethyl]-4-ethyl-5-methylthiazole

5 An amount of 1.0 g of 2-(3-aminostyryl)-4-ethyl-5-methylthiazole and 200 mg of 5% palladium-carbon were added to 20 ml of ethanol and catalytic reduction was carried out in a hydrogen gas atmosphere at room temperature and normal pressure for 12 hours. After the reaction mixture was filtered, the solvent was evaporated under reduced pressure to give 0.90 g (yield 90%) of the title compound as pale yellow crystals.  
 m.p.: 64-65 °C  
 10 IR:  $\nu$  = 3410, 1590, 1300, 1120, 950, 760 cm<sup>-1</sup>

Synthesis example 13Synthesis of various 2-[2-(3-aminophenyl)ethyl] thiazoles

15 By carrying out the treatment similarly as in Synthesis example 12, various 2-[2-(3-aminophenyl)ethyl]thiazoles shown as Nos. 34 and 35 in Table 1 were obtained.

Synthesis example 14Synthesis of 2-(trans-3-amino-4-hydroxystyryl) benzothiazole

20 To a solution of 282 mg of 2-(trans-3-amino-4-methoxystyryl)benzothiazole dissolved in 30 ml of dichloromethane was added 380 mg of phosphorous tribromide at 70 °C, and the mixture was gradually returned to room temperature and stirred overnight. After an aqueous saturated sodium, hydrogen carbonate solution was added to the reaction mixture to make it weakly alkaline, the mixture was extracted with ethyl acetate. The extract was dried over anhydrous magnesium sulfate and the solvent was evaporated under reduced pressure to give 260 mg (yield 97%) of the title compound.

m.p.: 192-193 °C  
 30 IR:  $\nu$  = 3400, 1590, 1510, 1290, 800, 760 cm<sup>-1</sup>

Synthesis example 15Synthesis of 2-(trans-3-amino-6-hydroxystyryl) benzothiazole

35 By carrying out the treatment similarly as in Synthesis example 14, the title compound shown as No. 33 in Table 1 was obtained.

Synthesis example 16Synthesis of 2-(trans-3-aminostyryl)-5-methoxycarbonylbenzothiazole

40 To a solvent mixture of 50 ml of dioxane and 30 ml of methanol, 2.0 g of 5-methoxycarbonyl-2-(trans-3-nitrostyryl)benzothiazole was added and, under vigorous stirring, a solution of 0.37 g of calcium chloride in 45 55 ml of water and 9.8 g of zinc powder were added, followed by refluxing for 2 hours. After cooled to room temperature, the reaction mixture was filtered and the filtrate was concentrated under reduced pressure, and the solid residue formed was washed with toluene to give 1.4 g (yield 77%) of the title compound.

m.p.: 165-167 °C  
 50 IR:  $\nu$  = 1710, 1630, 1305, 1100, 755 cm<sup>-1</sup>

Example 1Synthesis of 2-[trans-3-(cis-3-carboxypropenamide) styryl]benzothiazole (compound No. 1)

55 To 8 ml of toluene were added 158 mg of 2-(trans-3-aminostyryl)benzothiazole and 71 mg of maleic anhydride, and the mixture was heated at 80 °C for 1 hour. After cooled to room temperature, the crystals formed were collected by filtration and recrystallized from ethanol to give 194 mg (yield 88%) of the yellowish white title compound.

m.p.: 190-191 °C  
 IR:  $\nu = 1700, 1625, 1550, 1490, 1405, 953 \text{ cm}^{-1}$

Example 2

5

Synthesis of various anilide carboxylic acids

By carrying out the treatment similarly as in Example 1, the title compounds shown as compounds Nos. 2-165 and 445-448 in Table 2 were obtained.

10

Example 3

Synthesis of 2-(trans-3-oxalylaminostyryl)-4-phenylthiazole (compound No. 166)

15

To a suspension of 1.0 g of 2-(trans-3-ethyloxalylaminostyryl)-4-phenylthiazole in 40 ml of dioxane was added, under vigorous stirring, 1 ml of an aqueous 20% potassium hydroxide solution, and hydrolysis was carried out at room temperature for 1 hour. To the reaction mixture was added 20% hydrochloric acid to adjust the pH to 1-2, and the yellow precipitates formed were collected by filtration and washed with ethanol and chloroform, followed by drying under reduced pressure to give 870 mg (yield 94%) of the title compound.

20

m.p.: 291-292 °C  
 IR:  $\nu = 1715, 1685, 1590, 1520, 1300, 1180, 740 \text{ cm}^{-1}$

Example 4

25

Synthesis of various anilidecarboxylic acids

By carrying out the treatment similarly as in Example 3, the title compounds shown as compounds Nos. 167-169 in Table 2 were obtained.

30

Example 5

Synthesis of 2-[trans-3-(3-carboxypropylamino) styryl]-4-propylthiazole (compound No. 170)

35

To 20 ml of toluene were added 732 mg of 2-(trans-3-aminostyryl)-4-propylthiazole, 1170 mg of ethyl 4-bromobutyrate and 606 mg of triethylamine, and the reaction was carried out at 100 °C for 21 hours. After the reaction mixture was cooled to room temperature, 10 ml of ethanol and 10 ml of an aqueous 5% sodium hydroxide solution were added and the mixture was stirred at room temperature for 1.5 hours to effect hydrolysis of the ester. After completion of the reaction, ethanol was evaporated under reduced pressure and the residue was adjusted to pH 1-2 with addition of 10% hydrochloric acid, followed by extraction with ethyl ether. After drying over anhydrous magnesium sulfate, the solvent was evaporated and the solid formed was recrystallized from ethyl ether to give 629 mg (yield 64%) of the title compound.

40

m.p.: 115-116 °C  
 IR:  $\nu = 1705, 1595, 1480, 1190, 940, 740 \text{ cm}^{-1}$

45

Example 6

Synthesis of various anilinocarboxylic acid

50

By carrying out the treatment similarly as in Example 5, the title compounds shown as compounds Nos. 171-182 in Table 2 were obtained.

Example 7

55

Synthesis of 2-(trans-3-ethyloxalylaminostyryl)-4-phenylthiazole (compound No. 183)

To 30 ml of toluene were added 0.7 g of pyridine and 2.0 g of 2-(trans-3-aminostyryl)-4-phenylthiazole and a solution of 1.1 g of ethyloxalyl chloride in 5 ml of toluene was added dropwise at 0 °C under stirring,

followed by heating at 50 °C for 1.5 hours. The reaction mixture was poured into ice-cold water and crystals formed were collected by filtration and dried, followed by recrystallization from chloroform to give 2.5 g (yield 90%) of the title compound.

m.p.: 193-194 °C

5 IR:  $\nu$  = 3325, 1715, 1700, 1300, 730 cm<sup>-1</sup>

#### Example 8

##### Synthesis of various anilidecarboxylic acid esters

10 By carrying out the treatment similarly as in Example 7, the title compounds shown as compounds Nos. 184-188 in Table 2 were obtained.

#### Example 9

##### Synthesis of 2-[trans-3-(cis-3-isoamyoxy carbonylpropenamide)styryl]benzothiazole (compound No. 189)

To 6 ml of hexamethylphosphoric triamide were added 1.0 g of sodium salt of 2-[trans-3-(cis-3-carboxypropenamide)styryl]benzothiazole and 2.13 g of isoamyl iodide, and the mixture was stirred at room temperature for 4 hours. The reaction mixture was extracted with toluene in a conventional manner, the extract was dried over anhydrous magnesium sulfate and the solvent was evaporated under reduced pressure, followed by recrystallization of the residue from ethyl ether-toluene to give 616 mg (yield 55%) of the title compound.

m.p.: 82-83 °C

25 IR:  $\nu$  = 3400, 1720, 1660, 1580, 1440, 1200, 755 cm<sup>-1</sup>

#### Example 10

##### Synthesis of various anilidecarboxylic acid esters

30 By carrying out the treatment similarly as in Example 9, the title compounds shown as compounds Nos. 190-195 in Table 2 were obtained.

#### Example 11

##### Synthesis of 2-[trans-3-(4-ethoxycarbonyl)butylstyryl]benzothiazole (compound No. 196)

A mixture of 460 mg of ethyl 5-(3-formylphenyl) pentanoate, 322 mg of 2-methylbenzothiazole and 0.11 ml of acetic anhydride was heated under nitrogen gas stream to 170 °C for 30 hours. The reaction mixture 40 was directly purified through silica gel column chromatography by use of ethyl ether-n-hexane to obtain 320 mg (yield 45%) of the title compound as brown oily product.

IR:  $\nu$  = 1720, 1620, 1485, 1180, 950, 750 cm<sup>-1</sup>

NMR (CCl<sub>4</sub>):  $\delta$  = 1.25(3H,t), 1.35-2.05(4H,m), 2.01-2.85(4H,m), 4.07(2H,q), 7.05-8.10(10H,m)

#### Example 12

##### Synthesis of various 2-(trans-3-alkoxycarbonyl-alkylenestyryl)benzothiazoles

By carrying out the treatment similarly as in Example 11, the title compounds shown as compounds 50 Nos. 197 and 198 in Table 2 were obtained.

#### Example 13

##### Synthesis of 2-[trans-3-(3-ethoxycarbonylpropyl) aminostyryl]benzothiazole (compound No. 199)

To 10 ml of toluene were added 1.0 g of 2-(trans-3-aminostyryl)benzothiazole, 0.78 g of ethyl 4-bromo-butrate and 0.4 g of triethylamine, and the mixture was stirred at 100 °C for 20 hours. After cooled to room temperature, the mixture was extracted with toluene, dried over anhydrous magnesium sulfate and

then the solvent was evaporated under reduced pressure. The residue was purified through silica gel column chromatography by use of ethyl acetate-n-hexane to obtain 951 mg of the title compound (yield 66%).

m.p.: 68-69 °C

5 NMR ( $\text{CDCl}_3$ ):  $\delta = 1.25(3\text{H},\text{t}), 2.0(2\text{H},\text{m}), 2.35(2\text{H},\text{t}), 3.22(2\text{H},\text{t}), 4.23(2\text{H},\text{q}), 6.45-8.10(10\text{H},\text{m})$

#### Example 14

##### Synthesis of various anilinocarboxylic acid esters

10 By carrying out the treatment similarly as in Example 13, the title compounds shown as compounds Nos. 200-205 in Table 2 were obtained.

#### Example 15

##### Synthesis of 2-(trans-3-ethoxycarbonylmethoxystyryl)benzothiazole (compound No. 206)

To 30 ml of acetone were added 200 mg of 2-(trans-3-hydroxystyryl)benzothiazole, 0.11 ml of ethyl bromoacetate and 131 mg of potassium carbonate, and the mixture was refluxed for 4 hours. After cooled to room temperature, the mixture was extracted with ethyl ether, dried over anhydrous magnesium sulfate and then the solvent was evaporated under reduced pressure. After the crude crystals of the residue were washed with ethyl ether and n-hexane, they were dried under reduced pressure to give 207 ml (yield 77%) of the title compound.

m.p.: 150-151 °C

25 IR:  $\nu = 1720, 1585, 1260, 1190, 1025, 950, 755 \text{ cm}^{-1}$

#### Example 16

##### Synthesis of various alkoxy carbonylalkylphenylethers

30 By carrying out the treatment similarly as in Example 15, the title compounds shown as compounds Nos. 207-212 and 431-433 in Table 2 were obtained.

#### Example 17

##### Synthesis of 2-[trans-3-(cis-3-carboxypropenamide) styryl]benzothiazole sodium salt (compound No. 213)

To 350 ml of methanol was added 17.3 g of 2-[trans-3-(cis-3-carboxypropenamide)styryl]benzothiazole and then a solution of 4.1 g of sodium hydrogen carbonate in 75 ml of water, followed by refluxing for 1 hour. The solvent was evaporated under reduced pressure, and the crude crystals of the residue were washed with ethanol and ethyl ether, followed by drying under reduced pressure to give 18.9 g (yield: quantitative) of the title compound.

m.p.: 256-258 °C

45 IR:  $\nu = 1650, 1625, 1560, 1490, 855, 750 \text{ cm}^{-1}$

#### Example 18

##### Synthesis of sodium salts of various carboxylic acids having thiazole groups

50 By carrying out the treatment similarly as in Example 17, the title compounds shown as compounds Nos. 214-395 and 434-436 in Table 2 were obtained.

#### Example 19

##### Synthesis of 2-[trans-3-(3-carboxypropyl)aminostyryl]benzothiazole sodium salt (compound No. 396)

To 8 ml of ethanol were added 1.16 g of 2-[trans-3-(3-ethoxycarbonylpropyl)aminostyryl]benzothiazole and 5 ml of 5% aqueous sodium hydroxide solution, and the mixture was stirred at 60 °C for 1.5 hours.

After evaporation of the solvent together with toluene under reduced pressure, the residue was diluted with ethanol and heated to 50 °C. After cooled to room temperature, the crystals formed were collected by filtration and washed with ethanol-ethyl ether, followed by drying under reduced pressure to give 1.11 g (yield 97%) of the title compound.

5      m.p.: 239-240 °C  
       IR:  $\nu$  = 1360, 1570, 1410, 940, 760 cm<sup>-1</sup>

#### Example 20

##### 10 Synthesis of sodium salts of various carboxylic acids having thiazole groups

By carrying out the treatment similarly as in Example 19, the title compound shown as compounds Nos. 397-413 in Table 2 were obtained.

#### 15 Example 21

##### Synthesis of 2-[trans-3-(cis-2-carboxycyclohexanoyl)aminostyryl]benzothiazole N-methyl-D-glucamine salt - (compound No. 414)

20     Into a solvent mixture of 6 ml of methanol and 1 ml of water were added 96 mg of N-methyl-D-glucamine and 200 mg of 2-[trans-3-(cis-2-carboxycyclohexanoyl)aminostyryl]benzothiazole and the mixture was stirred at room temperature for 30 minutes. After evaporation of the solvent under reduced pressure, the crude crystals formed were recrystallized from ethanol-ethyl ether to obtain 215 mg (yield 73%) of the title compound.

25      m.p.: 113-115 °C, 245-246 °C  
       IR:  $\nu$  = 1680, 1540, 1410, 1080, 750 cm<sup>-1</sup>

#### Example 22

##### 30 Synthesis of salts with organic bases of various carboxylic acids having thiazole groups

By carrying out the treatment similarly as in Example 21, the title compounds shown as compounds Nos. 415-421 in Table 2 were obtained. In Table 2, the following abbreviations were used.

35      NMG: N-methyl-D-glucamine,  
       Tris: tris(hydroxymethyl)aminomethane

#### Example 23

##### Synthesis of 2-[trans-3-(4-hydroxybutanoylamino) styryl]benzothiazole (compound No. 422)

40     A solution of 1.0 g of 2-(trans-3-aminostyryl)-benzothiazole dissolved in 15 ml of anhydrous tetrahydrofuran was cooled to -78 °C and 2.8 ml of a n-hexane solution (1.55M) of n-butyl lithium was added dropwise in a nitrogen gas atmosphere. After a mixture was stirred at the same temperature for 25 minutes, 375 mg of  $\gamma$ -butyrolactone was injected, followed by stirring for 1 hour. After completion of the reaction, the mixture was extracted with ethyl acetate, dried over magnesium sulfate and the solvent was evaporated under reduced pressure. The crude crystals obtained were washed with ethyl ether and dried to obtain 160 mg (yield 12%) of the title compound.

45      m.p.: 191-192 °C  
       IR:  $\nu$  = 3400, 1640, 1580, 1530, 1420, 1050, 940, 755 cm<sup>-1</sup>

#### 50 Example 24

##### Synthesis of 2-[trans-3-(4-hydroxybutoxy)styryl]benzothiazole (compound No. 423)

55     To 40 ml of ethyl ether was added 1.0 g of 2-[trans-3-(3-ethoxycarbonylpropoxy)styryl]benzothiazole, and 114 mg of lithium aluminum hydride was added under ice-cooling. After the mixture was stirred at the same temperature for 30 minutes, then at room temperature for 40 minutes, 114  $\mu$ l of water, 114  $\mu$ l of 15% aqueous sodium hydroxide and 340  $\mu$ l of water were successively added slowly to decompose the

aluminum complex, followed by extraction with toluene. After drying over anhydrous magnesium sulfate, the solvent was evaporated under reduced pressure and the crude crystals formed were washed with ethyl ether under ice-cooling, followed by drying under reduced pressure to give 570 mg (yield 64%) of the title compound.

5 m.p.: 88-90 °C  
IR:  $\nu$  = 3280, 1590, 1570, 1285, 950, 760 cm<sup>-1</sup>

#### Example 25

##### 10 Synthesis of 2-[trans-3-(3-(5-tetrazolyl)propylamino)styryl]benzothiazole (compound No. 424)

To 5 ml of dimethylformamide were added 390 mg of sodium azide and 638 mg of 2-[trans-3-(3-cyanopropylamino)styryl]benzothiazole, and the mixture was heated to 120 °C for 7 hours. After cooled to room temperature, the mixture was extracted with ethyl acetate, dried over anhydrous magnesium sulfate and the solvent was evaporation under reduced pressure. The concentrate was purified through silica gel column chromatography by use of ethyl acetate to obtain 250 mg (yield 35%) of the title compound.

m.p.: 168-169 °C  
IR:  $\nu$  = 1625, 1595, 1460, 1430, 950, 760 cm<sup>-1</sup>

#### 20 Example 26

##### Synthesis of 2-[trans-3-(2-carboxyanilino)styryl] benzothiazole (compound No. 425)

To 10 ml of isoamyl alcohol were added 504 mg of 2-(trans-3-aminostyryl)benzothiazole, 311 mg of 2-chlorobenzoic acid, 290 mg of potassium carbonate, 1 mg of iodine and 15 mg of copper powder, and the mixture was refluxed for 6 hours. The solvent was evaporated under reduced pressure and the residue was extracted with ethyl acetate. The crude product after evaporation of the solvent was purified through silica gel column chromatography by use of ethyl acetate-toluene to obtain 83 mg (yield 11%) of the title compound.

30 IR:  $\nu$  = 1630, 1570, 1380, 1285, 1200, 750 cm<sup>-1</sup>  
m.p.: 146-150 °C

#### Example 27

##### 35 Synthesis of 2-[trans-3-(2-carboxyethylamino) styryl]benzothiazole sodium salt (compound No. 426)

To 1 ml of acetonitrile were added 1.0 g of 2-(trans-3-aminostyryl)benzothiazole and 1 ml of  $\beta$ -propiolactone, and the mixture was refluxed for 1 hour. After evaporation of acetonitrile under reduced pressure, toluene and 10% hydrochloric acid were added to the residue. After the insolubles were filtered off, the filtrate was made alkaline with addition of 10% aqueous sodium hydroxide solution and the precipitates formed were collected by filtration. The crude product was recrystallized from methanol-ethyl acetate to obtain 224 mg (yield 16%) of the title compound.

m.p.: 250 °C (decomposed)  
IR:  $\nu$  = 1565, 1405, 1005, 940, 750 cm<sup>-1</sup>

#### 45 Example 28

##### Synthesis of 2-[3-(2-carboxyethylamino)styryl]-4,5-dimethylthiazole sodium salt (compound No. 427)

50 An amount of 230 mg of 2-(trans-3-aminostyryl)-4,5-dimethylthiazole, 1 ml of methyl acrylate and two drops of acetic acid were added to 1.5 ml of toluene and the mixture was refluxed for 16 hours. The mixture was extracted in a conventional manner with ethyl acetate, the solvent was evaporated under reduced pressure and the residue was purified through silica gel column chromatography by use of ethyl acetate-n-hexane to obtain 160 mg of acrylate adduct. Next, 160 mg of the ester was dissolved in 5 ml of ethanol, and 55 2 ml of 5% aqueous sodium hydroxide was added to carry out hydrolysis by stirring at room temperature for 1 hour. The precipitates formed were collected by filtration, washed with water and then with ethyl ether, followed by drying under reduced pressure to obtain 90 mg (yield 28%) of the title compound.

m.p.: 120-123 °C

IR:  $\nu$  = 1595, 1550, 1405, 945, 765 cm<sup>-1</sup>

#### Example 29

##### 5 Synthesis of 2-[trans-3-(2-carboxyethylamino) styryl]-4-phenylthiazole sodium salt (compound No. 428)

By carrying out the treatment similarly as in Example 28, 93 mg (yield 23%) of the title compound was obtained.

m.p.: 261-263 °C (decomposed)

10 IR:  $\nu$  = 1700, 1590, 1440, 1220, 1195, 760 cm<sup>-1</sup>

#### Example 30

##### Synthesis of 2-[trans-3-(2-carboxyethoxy)styryl] benzothiazole (compound No. 429)

15 To 3 ml of dimethylformamide were added 47 mg of 60% sodium hydride and 300 mg of 2-(trans-3-hydroxystyryl)benzothiazole, and the mixture was stirred at room temperature for 30 minutes. Then, 74  $\mu$ l of  $\beta$ -propiolactone was added and the mixture was further stirred for 4.5 hours. The acidic portion was extracted in a conventional manner with chloroform, and after drying over anhydrous magnesium sulfate, the 20 solvent was evaporated under reduced pressure and the crude crystals were washed with ethyl ether, followed by drying under reduced pressure to give 118 mg (yield 31%) of the title compound.

m.p.: 177-178 °C

IR:  $\nu$  = 1705, 1590, 1440, 1215, 1195, 960, 760 cm<sup>-1</sup>

#### 25 Example 31

##### Synthesis of 2-[trans-3-(3-carboxy-3,3-dimethylpropyloxy)styryl]-4-isopropylthiazole (compound No. 430)

To a solution of 200 mg of 2-[trans-3-(3,3-dimethyl-3-ethoxycarbonylpropyloxy)styryl]-4-isopropylthiazole dissolved in 5 ml of ethanol were added 2 ml of 10% aqueous potassium hydroxide solution and three drops of 40% benzyltrimethylammonium hydroxide methanol solution, and the mixture was refluxed for 1 hour to effect hydrolysis of the ester. After completion of the reaction, ethanol was evaporated under reduced pressure and the residue was adjusted to pH 1-2 with addition of 10% hydrochloric acid and then extracted with ethyl ether. After drying of anhydrous magnesium sulfate, the solvent was evaporated and the 35 solid formed was recrystallized from methanol to give 123 mg (yield 66%) of the title compound.

m.p.: 112-113 °C

IR:  $\nu$  = 1705, 1285, 1160, 1100, 740 cm<sup>-1</sup>

#### Example 32

##### 40 Synthesis of various styrylcarboxylic acids

By carrying out the treatment similarly as in Example 31, the title compounds shown as compounds Nos. 438-444 in Table 2 were obtained.

#### 45 Example 33

##### Preparation of tablets

An amount of 1000 g of well pulverized 2-[trans-3-(cis-3-carboxypropenamide)styryl]benzothiazole sodium salt (compound No. 213), 5900 g of lactose, 2000 g crystalline cellulose, 1000 g of a low substitution degree hydroxypropyl cellulose and 100 g of magnesium stearate were well mixed and formed into plain tablets according to the direct tabletting method containing 10 mg of the above compound in 100 mg of one tablet. The plain tablet was applied with sugar coating or film coating to prepare sugar-coated tablet and film-coated tablet.

Example 34Preparation of capsules

5 An amount of 1000 g of well pulverized 2-[trans-3-(cis-3-carboxypropenamide)styryl]benzothiazole sodium salt (compound No. 213), 3000 g of corn starch, 6900 g of lactose, 1000 g of crystalline cellulose and 100 g of magnesium stearate were mixed to prepare capsules containing 10 mg of the above compound in 120 mg of one capsule.

Example 35Preparation of inhalent

10 An amount of 5 g of well pulverized 2-[trans-3-(cis-3-carboxypropenamide)styryl]benzothiazole sodium salt (compound No. 213), 10 g of a middle chain saturated fatty acid triglyceride and 0.2 g of sorbitane monooleate were well mixed, and each 15.2 mg of the mixture was weighed in 5 ml of an aluminum vessel for aerosol. Further, after 84.8 mg of Freon 12/114 (1 : 1 mixture) was filled per one vessel at low temperature, the vessel was equipped with a quantitative adaptor of 100 ul per 1 spray to prepare an inhalent of quantitative spray containing 5 mg of the above compound in 5 ml of one vessel.

Example 36SRS antagonistic action in vitro

15 The ileum end portion of a male Hartley-strain guinea pig weighing 200-450 g was extirpated and after washing its lumen, the ileum was mounted within 5 ml of a tissue bath containing a Tyrode solution comprising the following components. The components are 136 mM NaCl, 2.7 mM KCl, 11.9 mM NaHCO<sub>3</sub>, 1.05 mM MgCl<sub>2</sub>, 1.8 mM CaCl<sub>2</sub>, 0.4 mM NaH<sub>2</sub>PO<sub>4</sub> and 5.6 mM glucose. The liquid temperature in the bath was maintained at 37 °C, and aeration was effected with 95% oxygen / 5% carbon dioxide. For removing 20 shrinkage with hystamine and acetylcholine, 10<sup>-7</sup> g/ml of mepylamin and 5 × 10<sup>-8</sup> g/ml of atropin were added to the above buffer. Isotonic measurement was conducted by isotonic transducer (TD-112S, trade name, produced by Nippon Koden) tension replacement convertor and recorded by Recticoder (RTG-4124, trade name, produced by Nippon Koden) as the change in grams of tension. The ileum was loaded passively with 0.5 g of tension and the ileum shrinkage reaction to SRS extracted from guinea pig lung was obtained. The persistent shrinkage height by one unit of SRS (corresponding to 5 ng of hystamine) was used as control. Test drugs of various concentrations were added into the tissue bath, and the results of minimum effective concentration which is the concentration of the test drug attenuating shrinkage of control to 50% (IC<sub>50</sub>) are shown in Table 2 and Table 3.

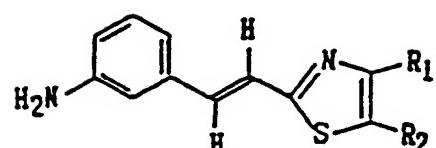
Example 37LTD<sub>4</sub> antagonistic action in vivo

25 For male Hartley-strain guinea pig weighing 350-500 g under urethane anesthesia, airway resistance was measured by use of a Harvard type respirator according to the method which is a modification of the Konzett-Roessler method, inhibition (%) by intraduodenal administration of the test drug against airway resistance increase by intravenous administration of 0.1-1.0 µg/kg of LTD<sub>4</sub> was calculated to obtain the results shown in Table 2 and Table 4.

Test exampleAcute toxicity test

30 With 4 to 5 ddY-strain male mice of 6 weeks old as one group, the compound of the present invention was orally administered as a suspension in 1% tragacanth solution, and observation was conducted for 7 days and the number of dead mice was examined to obtain the results shown in Table 5.

Table 1-1



(IIa)

No.	R <sub>1</sub>	R <sub>2</sub>	m.p. (°C)
1	Me	Me	148~149
2	Et	"	76~77
3	"	H	60~61
4	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>2</sub> -	"	61~62
5	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>3</sub> -	"	79~80
6	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>4</sub> -	"	56~57
7	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>5</sub> -	"	55~56
8	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>6</sub> -	"	56~57
9	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>7</sub> -	"	50~51
10	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>2</sub> -	Et	58~59
11	(CH <sub>3</sub> ) <sub>3</sub> C-	H	74~75
12	Me	CH <sub>3</sub> (CH <sub>2</sub> ) <sub>3</sub> -	58~59
13	C <sub>6</sub> H <sub>5</sub> -	"	138~139

No.	R <sub>1</sub>	R <sub>2</sub>	m.p. (°C)
14	-COOEt	H	93~ 94
15	-(CH <sub>2</sub> ) <sub>4</sub> -		156~ 157
16	C <sub>6</sub> H <sub>5</sub> -	H	137~ 139
17	p-C <sub>6</sub> H <sub>4</sub> -	"	177~ 178
18	m-Me-C <sub>6</sub> H <sub>4</sub> -	"	117~ 118
19	p-EtOOC-C <sub>6</sub> H <sub>4</sub> -	"	145~ 146
20	p-Me-C <sub>6</sub> H <sub>4</sub> -	"	156~ 157
21	p-MeO-C <sub>6</sub> H <sub>4</sub> -	"	141~ 142

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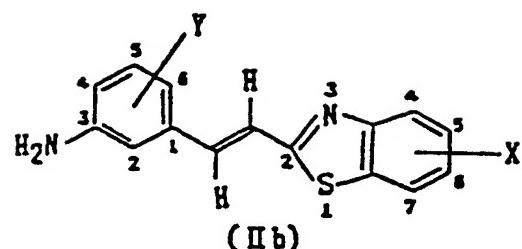
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Table 1-2



No.	X	Y	m.p. (°C)
22	H	H	178~179
23	5-OMe	"	143~144
24	5-Me	"	150~151
25	5-C <sub>2</sub>	"	168~169
26	6-OMe	"	158~160
27	H	2-Me	118~120
28	"	6-OMe	147~148
29	"	4-C <sub>2</sub>	174~176
30	"	6-C <sub>2</sub>	191~192
31	"	2-OE	180~181
32	"	4-OMe	155~156
33	"	6-OH	234~236

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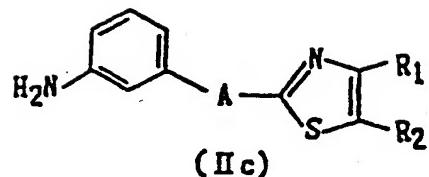
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Table 1-3



No.	R <sub>1</sub>	R <sub>2</sub>	A	m.p. (°C)
34			- $(CH_2)_2-$	79~80
35	$(CH_3)_2CH-$	H	"	-*
36	H	"	- $CH_2OCH_2-$	-**
37	"	"	- $OCH_2-$	120~121
38	"	"	- $NHCH_2-$	102~103

30 \* IR: 1600, 1450, 1160, 1100, 770, 730

\*\* IR: 1620, 1460, 1310, 1090, 865, 760

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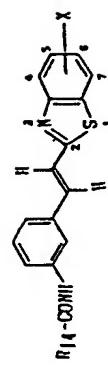
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Table 2-1



Compound No.	R14	$\lambda$	m.p. (°C)	Physical property values	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
2		II	193~ 4	IR 1700, 1670, 1580, 1541, 1260, 750		
3	cis	"	191~ 2	IR 1705, 1660, 1542, 1488, 1080, 755	$5 \times 10^{-6}$	
4	cis	"	190~ 3	IR 1705, 1660, 1600, 1540, 750, 760		
5	trans	"	230~ 7	IR 1715, 1650, 1530, 1080, 750, 750		
6	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	218~ 20	IR 1630, 1540, 1315, 1210, 760		
7	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	227~ 30	IR 1705, 1640, 1530, 1415, 1000, 765		
8	cis	"	169~ 90	IR 1690, 1670, 1410, 1200, 750, 750		
9		"	198~202	IR 1705, 1650, 1540, 1250, 760		
10		"				
11		"	177~ 8	IR 1710, 1670, 1545, 1200, 755		

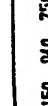
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Cum- pound No.	R <sub>14</sub>	X	m.R. (°C)	Physical property values	Anti-SRS action (minimum effective conc. (M))	Airway resistance increase inhibition (%)
12	Et	Et COOH	H	160~ 1 IR 1680, 1540, 1200, 950, 750		
13			"	191~ 2 IR 1705, 1680, 1540, 1180, 755		
14	He	He COOH	"	169~ 70 IR 1700, 1680, 1540, 1200, 950, 750		
15	He	He COOH	"	163~ 4 IR 1710, 1680, 1540, 750		
16	He	He COOH	"	140~ 1 IR 1700, 1655, 1540, 1310, 950, 750		
17	He	He COOH	"	191~ 2 IR 1680, 1540, 1417, 1190, 753		
18	He	He COOH	"	163~ 70 IR 3210, 2850, 1680, 1540, 1080, 950, 750		
19	C	5-He	211~ 2	IR 1695, 1620, 1550, 1400, 950, 765		
20		COOH	"	207~ 8 IR 1705, 1650, 1260, 940, 750, 690		
21	cis	cis COOH	"	104~ 5 IR 1715, 1680, 1525, 1200, 945, 750		
22		-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	249~ 50 IR 1710, 1650, 1580, 1180, 945, 800		
23		-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	236~ 8 IR 1710, 1655, 1425, 1200, 955, 700		
24	C	5-Cl	224~ 5	IR 1695, 1550, 1400, 950, 855, 785		

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Compound No.	R14	X	m.p. (°C)	Physical property values	Anti-SRS action minimum effective conc. (M)	Airway resistance increase inhibition (%)
25		5-CI	219~50	IR 1700, 1500, 1230, 1065, 705		
26	cis	"	189~90	IR 1700, 1520, 1350, 1200, 950, 800		
27	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	214~5	IR 1850, 1650, 1580, 1200, 940, 800		
28	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	226~7	IR 1705, 1670, 1540, 1200, 945, 800		
29		5-OEt	189~200	IR 1730, 1690, 1550, 1160, 850, 700		
30		"	139~9	IR 1710, 1580, 1235, 950, 700		
31	cis	"	>350	IR 1700, 1550, 1405, 1160, 1120, 950, 700		
32	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	251~2	IR 1700, 1650, 1180, 940, 800		
33	cis	6-OEt	208~9	IR 1710, 1660, 1600, 1540, 1405, 1200, 1180, 950		
167	HOOC-		277~80	NMR (CDCl <sub>3</sub> -DMSO-d <sub>6</sub> ) : δ = 6.55(2H,d), 6.83~6.8(1H, s), 10.07(1H, s) 2x10 <sup>-7</sup>		
168	HOOC-	"	213~5	NMR (CDCl <sub>3</sub> -DMSO-d <sub>6</sub> ) : δ = 7.33~8.30(1H, s), 10.73(1H, broad s)	10 <sup>-7</sup>	
169	EOOCC-	"	180~1.5	IR 1705, 1680, 1545, 1300, 760		
185	EOOCC-	"	150~4	IR 1730, 1700, 1300, 1208, 770		

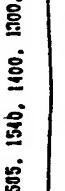
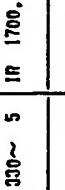
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Compound No.	R <sub>14</sub>	X	m.p. (°C)	Physical property values	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
186	EtOCOCH <sub>2</sub> -	"	131~ 7	IR 1710, 1650, 1550, 1440, 1150, 940, 750		
190		"	130~ 1	IR 1605, 1615, 1550, 1210, 750		
191		"	132~ 3	NMR (CDCl <sub>3</sub> ): δ = 1.92(6H,d), 1.27~1.90(8H,m), 4.11(2H,s), 6.82~6.25(6H,s)		
182	NaOC(CH <sub>2</sub> ) <sub>2</sub> -	"	140~ 1	IR 1735, 1680, 1580, 1420, 1155, 950, 760	5×10 <sup>-7</sup>	
193	EtOC(CH <sub>2</sub> ) <sub>2</sub> -	"	148~ 50	IR 1720, 1680, 1540, 1175, 765		
194		"	149~ 51	IR 1730, 1650, 1170, 950, 750		
195		"	82~ 3	IR 1720, 1580, 1440, 1200, 735		
214		"	171~ 3	IR 1560, 1480, 1445, 1220, 350		
215		"	274~ 7	IR 1640, 1680, 1580, 1500, 1310, 743		
216	cis 	"	255~ 7	IR 1610, 1550, 1493, 1405, 750	55	
217	cis 	"	150~ 60	IR 1680, 1580, 1420, 1305, 750		
218	NaOC(CH <sub>2</sub> ) <sub>2</sub> -	"	243~ 50	IR 1665, 1580, 1415, 945, 735		
219	NaOC(CH <sub>2</sub> ) <sub>3</sub> -	"	260~ 2	IR 1650, 1550, 1410, 940, 750		

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Compound No.	R <sub>14</sub>	X	m.p. (°C)	Physical property values	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
220	cis Me Me COOMe	"	100~ 3	IR 1705, 1560, 1405, 1310, 700		
221	Me Me COOMe	H	197~202	IR 1625, 1580, 1400, 950, 700		
222	Me Me COOMe	"	150~ 5	IR 1655, 1540, 945, 870, 750		
223	Me COOMe	"	168~ 71	IR 1600, 1550, 1495, 1440, 1215, 955, 755		
224	Me Me COOMe	"	120~ 5	IR 1650, 1540, 1210, 940, 750		
225	C <sub>6</sub> H <sub>5</sub> COOMe	"	125~ 30	IR 1635, 1540, 1365, 925, 730		
226	Me Me COOMe	"	125~ 30	IR 1650, 1545, 1400, 950, 750		
227	Me Me COOMe	"	160~ 3	IR 1665, 1550, 950, 750		5x10 <sup>-4</sup>
228	Me Me COOMe	"	200~ 1	IR 2910, 1655, 1545, 1305, 750		
229	Me Me Me COOMe	"	145~ 50	IR 1650, 1540, 1210, 950, 750		
230	Me COOMe	5-Me	225~ 3	IR 1600, 1530, 1440, 1305, 950, 700		
231	COOMe	"	273~ 5	IR 1660, 1580, 1550, 945		5x10 <sup>-4</sup>
232	cis Me COOMe	"	230~263	IR 1600, 1580, 1400, 1300, 950, 705		

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Compound No.	R <sub>14</sub>	X	m.p. (°C)	Physical property values	Anti-SKS action [minimum effective conc. (M)]	Airway resistance increase inhibitor (%)
233	NaOC(CH <sub>2</sub> ) <sub>2</sub> <sup>-</sup>	"	221~ 31	IR 1660, 1565, 1410, 850, 750		
234	NaOC(CH <sub>2</sub> ) <sub>3</sub> <sup>-</sup>	5-He	213~ 5	IR 1655, 1570, 1535, 1410, 1200		
235	cis 	5-COO <sub>2</sub> Me	330~ 5	IR 1700, 1565, 1540, 1400, 1300, 760		
236		5-Cl	257~ 60	IR 1650, 1580, 1490, 1430, 955		
237		"	239~ 0	IR 1600, 1550, 1555, 1490, 1350		
238	cis 	"	204~ 84	IR 1680, 1590, 1530, 1400, 850, 750		
239	NaOCOC(CH <sub>2</sub> ) <sub>2</sub> <sup>-</sup>	"	230~ 4	IR 1655, 1580, 1540, 1430, 940		
240	NaOCOC(CH <sub>2</sub> ) <sub>3</sub> <sup>-</sup>	"	215~ 7	IR 1650, 1570, 1540, 1430, 940		
241		5-OMe	215~ 7	IR 1650, 1585, 1420, 1200, 950, 800		
242		"	205~ 0	IR 1675, 1590, 1540, 1490, 1390		
243	cis 	8-OMe	>350	IR 1560, 1400, 1270, 1190, 800		
244	NaOCOC(CH <sub>2</sub> ) <sub>2</sub> <sup>-</sup>	"	241~ 3	IR 1655, 1550, 1420, 850, 725		
245	cis 	8-OMe	260~ 5	IR 1660, 1565, 1460, 1260, 850, 800		

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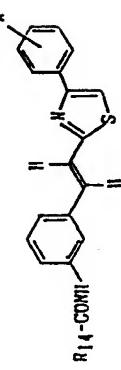
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Compound No.	R <sub>14</sub>	X	m.p. (°C)	Physical property values	Anti-SRS action[minimum effective conc. (M)]	Airway resistance increase inhibition (%)
415		H	173~ 80	IR 1625, 1560, 1350, 1060, 750		
416		"	108~ 9	IR 1625, 1615, 1550, 1360, 1050, 750		
417		"	135~ 40 221~ 5	IR 1650, 1550, 1475, 1080, 755		
418		"	95~ 6 (decomposition)	IR 1660, 1550, 1400, 1000, 750		
419	HOOC(CH <sub>2</sub> ) <sub>2</sub> • Tris	"	162~ 3	IR 1630, 1605, 1600, 1580, 1410, 1060, 750		
445		,	133~ 5	IR 1695, 1630, 1520, 1190, 750		

Table 2-2



Compound No.	$\text{R14}$	$\chi$	m.p. ( $^{\circ}\text{C}$ )	Physical property values (m)	Anti-SKS action [minimum effective conc.: (M)]	Airway resistance increase inhibition (%)
34		"	199~200	1740, 1720, 1700, 1620, 1540, 1400, 845, 725		$2 \times 10^{-6}$
35		"	201~ 5	1720, 1620, 1575, 1550, 1242, 735		
36		"	205~ 6	1635, 1600, 1540, 1440, 1210, 845, 750		
37		"	201~ 5	1630, 1500, 1410, 1200, 840, 755		
38	$-(\text{CH}_2)_2\text{COOH}$	"	237~ 8	1630, 1650, 1530, 1405, 735		
39	$-(\text{CH}_2)_3\text{COOH}$	"	160~ 2	1700, 1650, 1595, 1400, 850, 725		
40		"	158~ 60	2350, 2050, 1700, 1545, 1190, 850, 725		
41		"	202~ 3	1700, 1542, 1105, 945, 735		
42		"	184~ 5	1685, 1660, 1600, 1320, 850, 730		
43		"	102~ 4	1660, 1550, 1400, 1440, 1210, 855, 755		

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Compound No.	R <sub>14</sub>	X	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
44		p-Cl	201~ 7	1605, 1615, 1530, 1395, 1000, 945, 840, 735		
45		"	210~ 20	1720, 1640, 1620, 1610, 1590, 1245, 740, 700		
46	cis		"	211~ 5	1600, 1580, 1470, 1400, 840, 825, 770	
47	cis		"	210~ 3	1685, 1680, 1510, 1200, 840, 770	
48	-( $\text{CH}_2$ ) <sub>3</sub> COOH	"	170 ~ 81	1695, 1655, 1595, 1530, 1400, 850, 740		
49	cis		p-Me	203~ 4	1692, 1540, 1100, 850, 775	
50	cis		"	202~ 3	1600, 1540, 1200, 845, 775	
51	cis		p-Me	197~ 8	1600, 1540, 1100, 840, 770	
52	cis		p-OHMe	197~ 8	1605, 1530, 1250, 1175, 770	
53	cis		p-COOEt	204~ 5	1705, 1545, 1415, 1200	
216			"	225~ 8	1650, 1580, 1440, 950, 725	
217			"	236~ 70	1680, 1500, 1550, 1400, 1300, 850, 730	
218	cis		"	231~ 5	1642, 1540, 1400, 855, 735	5

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Compound No.	R <sub>14</sub>	X	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
248	cis		II	148~50 1650, 1540, 1400, 355, 720		
250	NaOC(CH <sub>2</sub> ) <sub>2</sub> -	"	205~8	1645, 1555, 1430, 1410, 815, 735		
251	NaOC(CH <sub>2</sub> ) <sub>3</sub> -	"	275~7	1660, 1600, 1540, 1400, 355, 730		
252	cis		"	170~4 1665, 1550, 1405, 350, 730 (decomposition)		
253	Me		"	150~2 1650, 1500, 1400, 1400, 350 (decomposition)	5×10 <sup>-8</sup>	
254			"	130~9 1660, 1550, 1490, 1440, 1210, 355, 735		
255			r-Cl	225~8 1500, 1470, 1085, 945, 735		
256			"	107~20 1660, 1610, 1590, 1530, 1385, 705		
257	cis		"	273~5 1650, 1550, 1465, 1080, 945, 825, 740		
258	cis		"	150~62 1660, 1560, 1470, 1400, 1085, 740		
259	NaOC(CH <sub>2</sub> ) <sub>3</sub> -	"	210~31	1660, 1600, 1550, 1400, 1025, 355, 745		
260	cis		r-Me	255~8 1665, 1580, 1480, 1405, 350, 740		
261	cis		"	152~3 1660, 1550, 1460, 1405, 350, 740		

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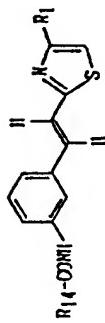
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Compound No.	R <sub>14</sub>	X	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]	Air-ray resistance increase inhibition (%)
262	cis- 	m-Me	170~ 80	1000, 1510, 1600, 950, 780, 730		
263	"	p-CMe	>200	1005, 1500, 1400, 1210, 745		
264	"	p-COOMe	>310	1630, 1590, 1510, 1400, 1200, 740		

Table 2-3



Compound No.	R <sub>14</sub>	R <sub>1</sub>	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc: (M)]	Airway resistance increase inhibition (%)
54	COOH	Me	157~ 8	1700, 1620, 1550, 365, 855	"	5x10 <sup>-7</sup>
55	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	199~200	1720, 1640, 1530, 1080, 945	"	
56	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	208~ 10	1705, 1645, 1525, 1080, 950	"	
57	COOH	Et	149~ 50	1690, 1620, 1530, 850	"	
58	COOH	"	181~ 3	1720, 1580, 1550, 1215, 700	"	
59	cis-Cyclohexyl COOH	"	152~ 3	1690, 1655, 1540, 1200, 730	"	
60	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	131~ 2	1690, 1540, 1320, 1190, 700	"	
61	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	146~ 7	1705, 1647, 1530, 1180, 950, 780	"	
62	COOH	Di(CH <sub>2</sub> ) <sub>2</sub>	151~ 2	1700, 1620, 1550, 1410, 860	"	
63	COOH	"	180~ 1	1720, 1625, 1580, 1245, 701	"	

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Compound No.	R <sub>14</sub>	R <sub>1</sub>	m.p. (°C)	Physical property values (III)	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
64	cis		Cl <sub>2</sub> (CH <sub>2</sub> ) <sub>2</sub> -	171~ 2	1605, 1510, 1200, 705	
65	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	"	173~ 4	1605, 1510, 1320, 1190, 850, 775	
66	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	"	170~ 1	1715, 1640, 1440, 1185, 850, 775	
67		Cl <sub>2</sub> (CH <sub>2</sub> ) <sub>3</sub> -	"	1695, 1615, 1545, 1400, 850, 855		
68		COOH	"	169~ 3	1715, 1650, 1575, 1480, 1240, 950, 780	
69	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	"	149~ 51	1700, 1680, 1540, 1480, 1320, 950, 755	
70	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	"	81~ 3	1600, 1650, 1600, 1555, 1405, 1135, 950, 775	
71		COOH	Cl <sub>2</sub> (CH <sub>2</sub> ) <sub>4</sub> -	143~ 4	1700, 1550, 1410, 970, 860	
72		COOH	"	178~ 9	1720, 1620, 1575, 1550, 1415, 1240, 960, 775	
73	cis		COOH	"	161~ 3	1690, 1510, 1440, 1410, 1200, 945
74	cis		COOH	"	153~ 5	1690, 1510, 1410, 1200, 945
75	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	"	149~ 51	1710, 1650, 1580, 1440, 1180, 945	
76	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	"	87~ 8	1610, 1550, 1505, 1340, 1200, 760	

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Compound No.	R <sub>14</sub>	R <sub>1</sub>	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
77		Cl <sub>3</sub> (CH <sub>2</sub> ) <sub>5</sub> -	142~ 3	1700, 1620, 1555, 1535, 1405, 865		
78		"	175~ 6	1710, 1625, 1580, 1550, 1250		
79	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	145~ 8	1720, 1660, 1595, 1530, 1440		
80	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	140~ 1	1715, 1645, 1580, 1530		
81		Cl <sub>3</sub> (CH <sub>2</sub> ) <sub>6</sub> -	140~ 1	1700, 1555, 1407, 860		
82		"	155~ 7	1720, 1623, 1580, 1243, 965, 760		
83	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	141~ 5	1720, 1660, 1530, 1180, 960, 760		
84	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	127~ 8	1710, 1653, 1530, 765		
85	Cl <sub>3</sub>	Cl <sub>3</sub> (CH <sub>2</sub> ) <sub>7</sub> -	160~ 2	1605, 1540, 1200, 940		
86		(OEt) <sub>2</sub> -	105~ 6	1700, 1550, 1405, 960, 860		
87		"	167~ 8	1720, 1580, 1220, 955, 760		
88	-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	171~ 2	1720, 1660, 1165, 960, 730		
89	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	139~ 40	1705, 1660, 1550, 1220, 960, 730		

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Compound No.	R <sub>1</sub>	R <sub>1</sub>	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
90		(CH <sub>2</sub> ) <sub>2</sub> CH-	140~ 9	1635, 1615, 1540, 1300, 815		
91		"	110~ 20	1630, 1620, 1525, 950		
92		"	102~ 3	1720, 1590, 1240, 953, 778		
93	cis	"	160~ 70	1705, 1640, 1533, 1185, 935		
94	- (CH <sub>2</sub> ) <sub>2</sub> COOH	"	150~ 9	1700, 1680, 1580, 1410, 955, 790, 740		
95	- (CH <sub>2</sub> ) <sub>3</sub> COOH	"	143~ 4	3270, 1710, 1640, 1440, 1180, 940		
96		"	175~ 6	1690, 1550, 1450, 960, 705		
97		"	175~ 6	2050, 1710, 1650, 1180, 950, 775		
98		"	160~ 1	1707, 1640, 1543, 1170, 960, 783		
99		"	139~200	1705, 1680, 1540, 960, 915		
100		"	155~ 6	1705, 1655, 1540, 1170, 955, 710		
101		"	147~ 8	1705, 1657, 1165, 955, 780		
102		"	154~ 5	1680, 1540, 1405, 1150, 950, 705		

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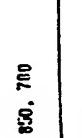
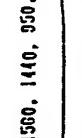
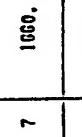
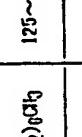
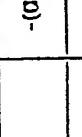
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Compound No.	R <sub>14</sub>	R <sub>1</sub>	m.p. (°C)	Physical property values (m)	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
100		COOCH <sub>3</sub>	"	1680, 1540, 950, 700		
101		COOCH <sub>3</sub>	155~ 6	3300, 2950, 1600, 1540, 950, 700		
265		COOCH <sub>3</sub>	150~ 7	1630, 1550, 1440, 940, 850, 705		
266	"	Et	135~ 10	1600, 1555, 1440, 850, 850, 700		
267		"	152~ 5	1650, 1500, 1385, 955, 700		
268	cis	COOCH <sub>3</sub>	"	144~ 6	1600, 1547, 1405, 850, 700	
269	NaOC(CH <sub>2</sub> ) <sub>2</sub> -		"	105~ 70	1660, 1555, 1410, 950, 705	
270	NaOC(CH <sub>2</sub> ) <sub>3</sub> -		"	210~ 1	1645, 1550, 1410, 850, 705	
271		COOCH <sub>3</sub>	118~ 20	1660, 1580, 1440, 850, 700		
272		"	161~ 3	1640, 1585, 1580, 950, 700		
273	cis	COOCH <sub>3</sub>	"	137~ 40	1660, 1550, 1405, 850, 700	
274	NaOC(CH <sub>2</sub> ) <sub>2</sub> -		"	103~ 5	1660, 1550, 1410, 1150, 950, 700	10 <sup>-7</sup>
275	NaOC(CH <sub>2</sub> ) <sub>3</sub>	"	105~ 7	1650, 1555, 1410, 850, 705		

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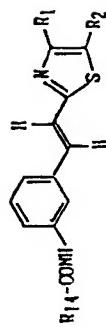
Compound No.	R <sub>14</sub>	R <sub>1</sub>	m.p. (°)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
276		-(CH <sub>2</sub> ) <sub>3</sub> CH <sub>3</sub>	123~7	1695, 1615, 1545, 1460, 950, 855		
277		-(CH <sub>2</sub> ) <sub>3</sub> CH <sub>3</sub>	120~5	1650, 1600, 1580, 1560, 1405, 1325, 955		
278	NaOC(CH <sub>2</sub> ) <sub>2</sub> -	"	105~90	1665, 1560, 1410, 950, 705		
279	NaOC(CH <sub>2</sub> ) <sub>3</sub> -	"	107~92	1650, 1500, 1555, 1495, 1410, 955		
280		-(CH <sub>2</sub> ) <sub>3</sub> CH <sub>3</sub>	135~8	1660, 1555, 1430, 948, 850		
281		"	118~20 (decomp-sition)	1660, 1545, 1410, 955, 700		
282	cis	COOEt <sub>2</sub>	135~40	1660, 1545, 1410, 950, 700		
283	cis	COOEt <sub>2</sub>	95~99	1660, 1560, 1410, 950, 700		
284	NaOC(CH <sub>2</sub> ) <sub>2</sub> -	"	170~6	1660, 1555, 1410, 945, 700		
285	NaOC(CH <sub>2</sub> ) <sub>3</sub> -	"	225~8	1610, 1545, 1410, 948, 707		
286		-(CH <sub>2</sub> ) <sub>3</sub> CH <sub>3</sub>	115~7	1695, 1570, 1440, 955, 860		
287		COOEt <sub>2</sub>	110~20	1650, 1600, 1580, 1560, 1490, 955	2×10 <sup>-8</sup>	
288	NaOC(CH <sub>2</sub> ) <sub>2</sub> -	"	178~80	1600, 1555, 1410, 950		

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Compound No.	R <sub>1</sub>	R <sub>2</sub>	m.p. (°C)	Physical property values (m)	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
289	NaOC(CH <sub>2</sub> ) <sub>3</sub> -	"	107~70	1650, 1550, 1410, 955		
290		-(CH <sub>2</sub> ) <sub>3</sub> COO-	125~7	1660, 1560, 1410, 950, 850, 700		
291		"	111~6	1650, 1500, 1390, 955, 780	10 <sup>-7</sup>	
292	NaOC(CH <sub>2</sub> ) <sub>2</sub> -	"	150~5	1660, 1550, 1410, 950, 705		
293	NaOC(CH <sub>2</sub> ) <sub>3</sub> -	"	193~200	1650, 1555, 1415, 955, 780		
294	cis 	-(CH <sub>2</sub> ) <sub>3</sub> COO-	111~3	1650, 1540, 1400, 950, 780		
295		-C(CH <sub>3</sub> ) <sub>3</sub>	151~6	1660, 1560, 1440, 1350, 950, 780		
296		"	168~71	1640, 1500, 1360, 1385, 955, 740		
297	NaOC(CH <sub>2</sub> ) <sub>2</sub> -	"	171~7	1660, 1600, 1560, 1415, 955		
298	NaOC(CH <sub>2</sub> ) <sub>3</sub> -	"	192~3	1660, 1605, 1560, 1415, 955	5×10 <sup>-8</sup>	
299		-C(CH <sub>3</sub> ) <sub>2</sub> COO-	110~5	1660, 1560, 1440, 1350, 950, 780		
300		"	145~50	1650, 1600, 1555, 1380, 950, 740		
301	cis 	"	130~2	1660, 1540, 1400, 955, 780		

Compound No.	R <sub>14</sub>	R <sub>1</sub>	m.p. (°C)	Physical property values	Anti-SRS action [min. effective conc. (N)]	Airway resistance increase inhibition (%)
302	NaOC(CH <sub>2</sub> ) <sub>2</sub> <sup>-</sup>	"	207~10	1660, 1550, 1410, 945, 780		
303	NaOC(CH <sub>2</sub> ) <sub>3</sub> <sup>-</sup>	-O(CH <sub>2</sub> ) <sub>2</sub>	260~70	1650, 1555, 1408, 943, 690		
304		"	150~3	1660, 1550, 1445, 1400, 1210, 955, 780		
305		"	120~6	1660, 1550, 1410, 950, 780		
306		"	100~5	1650, 1540, 1400, 950, 780		
307		"	127~30	1660, 1575, 1380, 930, 710	2x10 <sup>-9</sup>	
308		"	120~5	1660, 1550, 1260, 960, 785		96
309		"	55~60	1650, 1550, 1400, 950, 780		
310		"	130~5	1650, 1510, 1400, 950, 775		93
311		"	120~3	1650, 1510, 1400, 950, 780		
312		"	90~35	1650, 1540, 1400, 950, 780		
446		-(CH <sub>2</sub> ) <sub>2</sub> CH <sub>3</sub>	159~60	1670, 1520, 1190, 960, 760		
447		'	155~6	1670, 1540, 1410, 950, 780		
448		'	164~5	1680, 1580, 1410, 1200, 955		

Table 2-4



Compound No.	<i>R</i> <sub>14</sub>	<i>R</i> <sub>1</sub> , <i>R</i> <sub>2</sub>	m.p. (°C)	Physical property values (IR)	Anti-SRS action (minimum effective conc. M)	Airway resistance increase inhibition (%)
105		Me, Me	150~2	1705, 1620, 1580, 1540, 940, 840		
106		"	181~3	1700, 1650, 1545, 1255, 785		
107	cis	"	175~7	1660, 1600, 1545, 1210, 960, 780		
108	trans	"	195~200	1705, 1655, 1605, 1545, 1100, 930, 780		
109	cis	"	197~200	1600, 1500, 1510, 1430, 1215, 350, 780		
110	-(CH <sub>2</sub> ) <sub>2</sub> COOII	"	203~4	1710, 1660, 1600, 1550, 1400, 1230, 730		
111	-(CH <sub>2</sub> ) <sub>3</sub> COOII	"	166~9	1700, 1660, 1600, 1550, 1210, 945		
112	cis	"	206~7	1675, 1540, 1405, 1200, 940, 785		
113		"	167~70	1650, 1540, 1440, 780		
114	Me	"	183~200	1680, 1540, 1200, 950, 780		

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Compound No.	R <sub>1</sub>	R <sub>1</sub> , R <sub>2</sub>	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
115		Et, Me	173~ 4	1670, 1540, 1410, 1260, 955, 800		
116		"	180~ 7	1720, 1590, 1250, 950, 700		
117	cis		"	180~ 7	3320, 2910, 1630, 1540, 1410, 945, 700	
118		-(CH <sub>2</sub> ) <sub>2</sub> COOEt	"	215~ 6	1600, 1540, 1300, 950, 700	
119		-(CH <sub>2</sub> ) <sub>3</sub> COOEt	"	163~ 4	3270, 1710, 1650, 1530, 1200, 780	
120	cis		"	178~ 9	1700, 1660, 1540, 1210, 700	
121	Me		"	200~ 1	1703, 1650, 1540, 1250, 700	
122			"	211~ 2	1680, 1540, 1410, 950, 785	
123	Me		"	209~ 10	1677, 1540, 1200, 950, 785	
124	Me		"	104~ 5	1700, 1655, 1600, 1540, 1175, 950, 785	
125			Et	144~ 5	1720, 1600, 1550, 948, 845	
126			"	142~ 3	1700, 1430, 1380, 1100, 710	
127	cis		"	161~ 3	1630, 1650, 1540, 1210, 950, 780	

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Compound No.	R <sub>1</sub>	R <sub>1</sub> + R <sub>2</sub>	m.p. (°C)	Physical property values (IR)	Anti-SRS [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
128	-(CH <sub>2</sub> ) <sub>2</sub> COOH	Cl <sub>2</sub> (CH <sub>2</sub> ) <sub>2</sub> -Et	160~ 1	1710, 1600, 1605, 1545, 960, 785		
129	-(CH <sub>2</sub> ) <sub>3</sub> COOH	"	61~ 2	1605, 1660, 1605, 1340, 1195, 780		
130		Cl <sub>2</sub> Cl <sub>5</sub> -, -(CH <sub>2</sub> ) <sub>3</sub> Cl <sub>3</sub>	204~ 8	1720, 1620, 1580, 1545, 1235, 950, 780		
131	cis		"	1680, 1500, 1530, 1410, 1200, 950, 785		
132		He -, -(CH <sub>2</sub> ) <sub>3</sub> Cl <sub>3</sub>	173~ 6	1720, 1620, 1580, 1545, 1240, 955, 780		
133	cis		"	164~ 7	1700, 1655, 1600, 1540, 1080, 950, 780	
134	cis		-(CH <sub>2</sub> ) <sub>2</sub> Cl <sub>3</sub> , Et	161~ 3	1630, 1650, 1540, 1210, 950, 780	
135	cis		-COOEt, II	202~ 4	1680, 1545, 1415, 1205, 950, 780	
136			-(CH <sub>2</sub> ) <sub>4</sub> -	190~ 3	1698, 1541, 1405, 950, 785	
137		-(CH <sub>2</sub> ) <sub>2</sub> COOH	"	230~ 7	1600, 1595, 1530, 1250, 904	
169	HOOC		He , He	255~ 60	1710, 1670, 1600, 1545, 1250, 970, 785	
187	EtOOCC		"	163~ 4	1700, 1680, 1550, 1235, 1155, 780	
313			"	163~ 7	1620, 1550, 1460, 1350, 1210, 940, 850	

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Compound No.	R <sub>1</sub>	R <sub>1</sub> , R <sub>2</sub>	m.p. (°C)	Physical property values (IR)	Anti-SRS action (minimum effective conc. [M])	Airway resistance increase inhibition (%)
314		He, He	165~ 7	1655, 1500, 1550, 1385, 850, 780		
315	cis		"	177~ 9	1675, 1550, 1440, 1410, 850, 780	
316	Trans		"	242~ 0	1660, 1550, 1405, 845, 775	
317	cis		"	177~ 80	1660, 1575, 1510, 1430, 780	85
318	NaOC(CH <sub>2</sub> ) <sub>2</sub> -		"	203~ 0	1650, 1630, 1580, 1410, 850, 780	
319	NaOC(CH <sub>2</sub> ) <sub>3</sub> -		"	201~ 3	1655, 1555, 1410, 850, 780	
320			"	167~ 70	1650, 1540, 1440, 1250, 850, 775	
321	He		"	155~ 60	1660, 1540, 1400, 850, 780	
322			Et, He	141~ 2	1660, 1555, 1435, 1350, 845, 780	
323			"	151~ 3	1650, 1560, 1385, 850, 780	
324	cis		"	150~ 5	1665, 1515, 1405, 855, 780	
325	NaOC(CH <sub>2</sub> ) <sub>2</sub> -		"	184~ 6	1660, 1580, 1410, 845	
326	NaOC(CH <sub>2</sub> ) <sub>3</sub> -		"	205~ 10	1615, 1550, 1410, 850, 830, 780	

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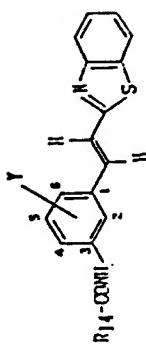
Compound No.	R <sub>14</sub>	R <sub>1</sub> , R <sub>2</sub>	m.p. (°C)	Physical property values (IR) cm <sup>-1</sup>	Anti-SRS action (minimum effective conc. (M))	Airway resistance increase inhibition (%)
327	cis Me	COONa	Et, Me	163~ 8 (decompn) 1665, 1550, 1410, 955, 705		
328	Me	COONa	"	100~ 5 1650, 1550, 1405, 1320, 950, 700	5×10 <sup>-9</sup>	
329		COONa	"	145~ 50 1655, 1545, 1440, 1210, 950, 780		
330	Me	COONa	"	145~ 50 1660, 1545, 1410, 1360, 950, 780		
331	Me	COONa	"	130~ 5 1650, 1510, 1400, 950, 780		
332		COONa	CH <sub>2</sub> Cl <sub>2</sub> , Et	153~ 7 1660, 1560, 1440, 950, 850, 700	10 <sup>-7</sup>	
333		COONa	"	135~ 7 1640, 1550, 1393, 950, 780		
334	cis	COONa	"	163~ 6 1655, 1540, 1405, 950, 780		
335	NaOC(CH <sub>2</sub> ) <sub>2</sub> -		"	164~ 6 1660, 1550, 1405, 950, 775		
336	NaOC(CH <sub>2</sub> ) <sub>3</sub> -		"	168~ 9 1650, 1550, 1405, 950, 780		
337		COONa	CH <sub>2</sub> Cl <sub>2</sub> , (CH <sub>2</sub> ) <sub>2</sub> Cl <sub>2</sub>	108~ 92 1580, 1550, 1460, 1385, 770, 630		
338	cis	COONa	"	153~ 5 1660, 1545, 1460, 1405, 770, 630		
339		COONa	Me-(CH <sub>2</sub> ) <sub>3</sub>	130~ 41 1645, 1545, 1360, 950, 780		

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Compound No.	R <sub>14</sub>	R <sub>1</sub> . R <sub>2</sub>	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]	Airway resistance increase inhibition (%)
340	cis 	Ne,-(Cl <sub>2</sub> ) <sub>2</sub> O <sub>2</sub> H <sub>2</sub>	105~ 9	1660, 1540, 1440, 1405, 360, 780		
341	"	-(Cl <sub>2</sub> ) <sub>2</sub> O <sub>2</sub> H <sub>2</sub>	163~ 6	1655, 1540, 1405, 1200, 350, 780		
342	"	-COOC <sub>2</sub> H <sub>5</sub> , H	177~ 80	1710, 1670, 1545, 1400, 1220, 780		
343		-((Cl <sub>2</sub> ) <sub>2</sub> I) <sub>2</sub>	210~ 50	1660, 1550, 1430, 1310, 810		
344	NaOCC(Cl <sub>2</sub> ) <sub>2</sub> -	"	250~ 60	1665, 1505, 1520, 1400, 350, 810		

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Table 2-5



Compound No.	R <sub>14</sub>	$\gamma$	m.p. (°C)	Physical property values (IR)
138	cis	6-0II	304~ 6	1600, 1635, 1510, 1210, 960, 750
139	"	4-CI	176~ 8	1710, 1660, 1515, 1200, 945, 760
140	"	2-Me	169~ 70 (decomposition)	1700, 1650, 1435, 1215, 955, 760
141	"	4-0II	305~ 7	1690, 1640, 1500, 1445, 1260, 760
142	"	4-OMe	179~ 80	1670, 1430, 1250, 1050, 760
143	"	6-OMe	197~ 8 (decomposition)	1710, 1635, 1225, 1170, 960, 760
144	"	2-0II	200 (decomposition)	1720, 1710, 1690, 1445, 750
145		"	185~ 6	3300, 2950, 1680, 1630, 1445, 965, 750
315	cis	6-OH	214~ 7	1610, 1540, 1460, 1240, 955, 750
316	"	4-CI	160~ 72	1650, 1560, 1400, 1040, 755

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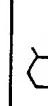
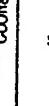
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Com- ound No.	R <sub>14</sub>	$\gamma$	m.p. (°C)	Physical property values (IR)
347	cis- 	2-Me	196~201	1635, 1560, 1405, 850, 755
348	"	4-Cl	254~ 7	1600, 1590, 1510, 1200, 820, 760
349	"	4-OMe	231~ 6	1670, 1565, 1530, 1255, 755
350	"	6-OMe	178~ 82	1650, 1550, 1500, 1400, 1235, 1030, 760
351	"	2-OMe (decompo- sition)	240	1680, 1510, 1190, 755
352	Et 	"	200~ 5	1550, 1430, 360, 750

Compound No.	A	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]
146	-OCl <sub>2</sub> -	162~ 3	1700, 1625, 1575, 1490, 755	
147	-O(ClCO) <sub>2</sub> -	130~ 40	1700, 1625, 1555, 1530, 953, 753	
148	-COMI-	217~ 9	1670, 1540, 1290, 1200, 750	
149	-OII-II-COMI-	210~ 1	1705, 1695, 1620, 1500, 1540, 1295, 1160, 750	
150	-NHC <sub>2</sub> -	158~ 9	1630, 1610, 1490, 840, 750	$2 \times 10^4$
151	-(Cl <sub>2</sub> ) <sub>2</sub> -	154~ 5	1700, 1620, 1550, 850, 750	

Table 2-6

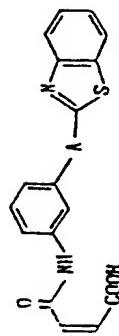
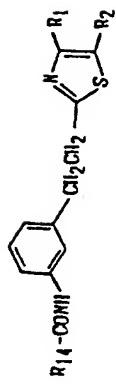


Table 2-7



Compound No.	R <sub>14</sub>	R <sub>1</sub> + R <sub>2</sub>	m.p. (°C)	Physical property values	Anti-SGS action [minimum effective conc. (M)]
152			151~ 3	IR 1700, 1650, 1610, 1490, 1245	
153	cis	"	150~ 61	IR 1710, 1610, 1580, 1440, 1180, 750	
154	cis	"	-	IR 1710, 1605, 1550, 1290, 730 NMR ( $\delta$ , ppm) 2.15~2.75 (m), 2.75~3.55 (m), 5.57 (d), 6.75~8.10 (br, s)	
155	- $(\text{CH}_2)_2\text{COO-}$	"	161~ 2	IR 1720, 1660, 1220, 1175, 760	
156		"	158~ 9	IR 1697, 1650, 1540, 735	
157		"	163~ 4	IR 1720, 1653, 1525, 1465, 735	
158		"	130~ 1	IR 1710, 1660, 1540, 1460, 735	
159		"	130~ 1	IR 2910, 1680, 1640, 1430	
160	cis	( $\alpha,\beta$ )Dl-, II	125~ 8	IR 1670, 1660, 1535, 1440, 1210, 760	
161		"	125~ 7	IR 1690, 1660, 1515, 1440, 1210, 730	

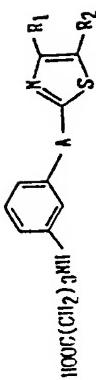
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Compound No.	R <sub>14</sub>	R <sub>1</sub> , R <sub>2</sub>	m.p. (°C)	Physical property values	Anti-SRS action [minimum effective conc. (M)]
162		(Cl <sub>3</sub> ) <sub>2</sub> Cl-, II	70~ 00	IR 1710, 1660, 1605, 1440, 1175, 780	
163		Et, Na	149~ 50	IR 2920, 1680, 1430, 1190, 705	
164		"	135~ 6	IR 1677, 1540, 1430, 1190, 705	
165		"	115~ 6	IR 1705, 1655, 1605, 1400, 1175, 700	
166	MeOCOC-		112~ 3	NMR (CDCl <sub>3</sub> ): δ=1.3~3.7(4H,m), 3.96(1H,s), 6.30~6.08(6H,m), 8.80(1H,broad s)	
353		"	90~100 (decompo-sition)	IR 1560, 1435, 980, 760	2×10 <sup>-7</sup>
354		"	116~ 20	IR 1650, 1500, 1560, 1385, 755	
355	cis	"	223~ 7	IR 1660, 1560, 1405, 755	
358	cis	"	201~ 10	IR 1660, 1550, 1425, 1200, 735	
357	NaOCOC(Cl) <sub>2</sub> Cl <sup>-</sup>	"	145~ 8	IR 1650, 1550, 1420, 750	
359		"	82~102	IR 1655, 1545, 1435, 755	10 <sup>-8</sup>
359		"	80~ 85	IR 2850, 1655, 1550, 1430, 355	
360		"	70~ 80	IR 2850, 1650, 1550, 1410, 350	

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Compound No.	R <sub>14</sub>	R <sub>1</sub> . R <sub>2</sub>	m.p. (°C)	Physical property values	Anti-SRS action [minimum effective conc. (M)]
361			55~ 80	IR 2910, 1615, 1515, 1410, 730	
362		-CH <sub>2</sub> (CH <sub>2</sub> ) <sub>2</sub> H	86~ 90	IR 1650, 1510, 1410, 1205, 735	2x10 <sup>-8</sup>
363		"	82~ 9	IR 1650, 1510, 1400, 1105, 735	
364		"	87~ 70	IR 1650, 1510, 1400, 1180, 735	
365		Et . Me	95~100	IR 2910, 1650, 1515, 1300, 780	
366		"	75~ 90 (decompo- sition)	IR 2950, 1650, 1510, 1435, 875, 780	5x10 <sup>-8</sup>
367		"	120~ 1 (decompo- sition)	IR 2950, 1650, 1515, 1435, 1300, 780	

Table 2-8



Compound No.	A	R <sub>1</sub> , R <sub>2</sub>	m.p. (°C)	Physical property values
171	-CH=CH-	-(CH <sub>2</sub> ) <sub>2</sub> Cl <sub>2</sub> , El	115~ 6	IR 1705, 1530, 1330, 1190, 940, 670
172	"	-Cl(CH <sub>2</sub> ) <sub>2</sub> , II	112~ 3	IR 1690, 1530, 1405, 1105, 945, 775
173	"	 , II He	83~ 5	IR 1670, 1530, 1330, 945, 730
174	"	El, He	129~ 30	IR 1705, 1600, 1330, 1190, 940, 780
175	"	-(CH <sub>2</sub> ) <sub>2</sub> Cl <sub>2</sub> , II	127~ 6	IR 1700, 1530, 1330, 1180, 965, 715
176	"	C(CH <sub>3</sub> ) <sub>3</sub> , II	106~ 7	IR 1700, 1600, 1510, 950, 760
177	"	El, II	115~ 6	IR 1695, 1530, 1180, 950, 780
178	"	-(CH <sub>2</sub> ) <sub>2</sub> Cl <sub>2</sub> , II	96~ 9	IR 1705, 1530, 1330, 1190, 945
179	"	-(CH <sub>2</sub> ) <sub>2</sub> Cl <sub>2</sub> , II	113~ 4	IR 1710, 1600, 1330, 1190, 720
180	"	-(CH <sub>2</sub> ) <sub>2</sub> Cl <sub>2</sub> , II	109~ 9	IR 1710, 1530, 1330, 1190, 720

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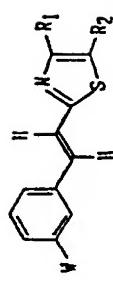
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Com- ound No.	A	$\mu_1, \mu_2$	Physical property values		
			m.p. (°C)	IR NMR (CDCl <sub>3</sub> ): δ = 1.7~2.7(5H, s), 3.15(2H, t), 4.50(2H, t), 4.8(2H, s), 6.4~8.1(9H, s)	
181	-CH <sub>2</sub> OCH <sub>2</sub> -	▷	-	IR 1695, 1600, 1100, 755	
182	-OCH <sub>2</sub> -	/	120~ 3	IR 1705, 1600, 1250, 1180	

Table 2-9



Compound No.	<i>W</i>	R <sub>1</sub> , R <sub>2</sub>	<i>m.p.</i> (°C)	Physical Property values	Anti-SRS action [minimum effective conc. (M)]
197	EtOOC(CH <sub>2</sub> ) <sub>4</sub> -	C <sub>6</sub> H <sub>5</sub> , H	76~ 9	IR 1720, 1490, 1180, 160, 740	
198	"	He, He	-	IR 1720, 1540, 1440, 1175, 550, 760 <i>NMR</i> (CDCl <sub>3</sub> ): 6~1.25(3H, t), 1.5~1.9(H, m), 2.3(s, CH <sub>3</sub> ), 2.2~2.9(m, 4H), 4.1(2H, s), 6.9~7.4(6H, m)	
200	EtOOCCH <sub>2</sub> MH-	▷	121~ 4	IR 1720, 1690, 1220, 950, 758	
201	EtOOC(CH <sub>2</sub> ) <sub>4</sub> MH-	"	100~ 9	IR 1710, 1595, 1180, 750	
202	"	C <sub>6</sub> H <sub>5</sub> , H	110~ 1	IR 1710, 1595, 1470, 1185, 720	
203	EtOOC(CH <sub>2</sub> ) <sub>3</sub> H-	He, He	-	IR 1710, 1595, 1480, 1280, 1190, 755 <i>NMR</i> (CDCl <sub>3</sub> ): 6~1.25(3H, t), 2.00(2H, m), 2.35(CH <sub>3</sub> , s), 2.25~2.50(2H, m), 3.20(2H, m), 4.16(2H, s), 6.28~7.35(6H, m)	
204	EtOOC(CH <sub>2</sub> ) <sub>3</sub> H-	C <sub>6</sub> H <sub>5</sub> , H	89.5~ 30	<i>NMR</i> (CDCl <sub>3</sub> ): 6~1.25(3H, t), 1.70~2.40(HH, m), 3.20(2H, m), 4.13(2H, q), 6.38~8.00(12H, m)	
207	EtOOC(CH <sub>2</sub> ) <sub>3</sub> -	▷	125~ 7	IR 1720, 1590, 1273, 1190, 770	
208	EtOOC(CH <sub>2</sub> ) <sub>3</sub> -	"	72~ 3	IR 1720, 1590, 1180, 970, 755	
209	EtOOC(CH <sub>2</sub> ) <sub>3</sub> -	C <sub>6</sub> H <sub>5</sub> , H	85~ 86	IR 1725, 1265, 1180, 945, 730	

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Compound No.	$\text{V}$	$\text{R}_1, \text{R}_2$	m.p. (°C)	Physical property values	Anti-SRS action [minimum effective conc. (M)]
210			-	IR 1720, 1570, 1140, 950, 760	
211		"	-	NMR(CDCl <sub>3</sub> ): δ = 0.72~2.97(1H, s), 3.02(3H, s), 3.40~4.21(2H, m). IR 1720, 1570, 1145, 950, 760	
212		"	87~ 8	NMR(CDCl <sub>3</sub> ): δ = 1.26(6H, s), 1.98(2H, t), 3.82(3H, s), 3.92(2H, t). IR 1710, 1570, 1290, 1040, 740	
373	$\text{NaOOC(CH}_2)_2\text{NH}^-$	"	213~ 40	IR 2925, 1560, 1430, 1310, 955, 750	
374	"	$\text{C}_6\text{H}_5\text{-II}$	270~ 1	IR 2825, 1580, 1430, 960, 730	$2 \times 10^7$
375			215~ 8	IR 1570, 1510, 1380, 1280, 750	$2 \times 10^7$
394	$\text{NaOOC(CH}_2)_2\text{O}^-$	"	239~ 41 (decomposition)	IR 1570, 1420, 1200, 950, 750	
395	$\text{NaOOC(CH}_2)_2\text{OH}^-$	"	255~ 8	IR 1550, 1420, 1170, 940, 750	$5 \times 10^7$
397	$\text{NaOOCCH}_2\text{Mn}^{2+}$	"	257~ 60	IR 1595, 1570, 1410, 940, 745	
398	$\text{NaOOC(CH}_2)_2\text{NH}^-$	"	239~ 40	IR 1595, 1555, 1430, 955, 750	
399	"	$\text{C}_6\text{H}_5\text{-II}$	270~ 1	IR 1600, 1560, 1430, 960, 730	
401	$\text{NaOOCCH}_2\text{O}^-$		>320	IR 1590, 1425, 940, 745	
402	$\text{NaOOC(CH}_2)_2\text{O}^-$	"	260~ 2	IR 1550, 1420, 940, 750	

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Compound No.	W	R <sub>1</sub> , R <sub>2</sub>	m.p. (°C)	Physical property values	Anti-SRS action [minimum effective conc. (M)]
400	NaOC(CH <sub>2</sub> ) <sub>3</sub> O-	OEt <sub>2</sub> , H	209~90	IR 1515, 1415, 850, 730	
401	NaOC(CH <sub>2</sub> ) <sub>4</sub> O-	Cyclohexadiene	216~9	IR 1560, 1430, 1270, 750	
405		"	730 (decomposition)	IR 2920, 1620, 1560, 1440, 750	
406	H <sub>2</sub>	"	198~203	IR 1575, 1520, 1480, 1445, 1165, 950, 760	
407		"	250 (decomposition)	IR 1545, 1400, 1200, 1030, 740	5x10 <sup>-4</sup>
408	NaOC(CH <sub>2</sub> ) <sub>3</sub> -	"	>350	IR 1615, 1425, 1365, 1090, 1070, 823	
410	NaOC(CH <sub>2</sub> ) <sub>4</sub> -	"	227~30	IR 1560, 1410, 945, 750	
411	NaOC(CH <sub>2</sub> ) <sub>5</sub> -	"	270~82	IR 1560, 1430, 1310, 950, 750	10 <sup>-3</sup>
412	NaOC(CH <sub>2</sub> ) <sub>4</sub> -	OEt <sub>2</sub> , H	265~8	IR 1550, 1440, 960, 730	
413	"	Me, Me	205~90	IR 1560, 1410, 950, 785	
431	Me	-CH(C <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> , H oil	NMR (CDCl <sub>3</sub> ): δ = 1.4 (6H, s), 1.45 (6H, d), 1.4 (3H, t), 2.15 (2H, t), 2.9~3.4 (1H, m), 3.95~4.42 (4H, m), 6.7~7.42 (7H, m) IR 1720, 1590, 1260, 1145, 1020		

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Compound No.	W	R <sub>1</sub> , R <sub>2</sub>	m.p. (°C)	Physical property values	Anti-SRS action [minimum effective conc. (M)]
432		-CH(CH <sub>3</sub> ) <sub>2</sub> , H	0.11	NMR(CDCl <sub>3</sub> ): δ=1.33(6H, d), 1.69(4H, q), 1.85(6H, t), 2.07(2H, t), 2.80~3.40(1H, m), 3.65(3H, s), 3.92~(2H, t), 6.66~7.35(7H, m) IR 1720, 1590, 1240, 1140, 1040	
433		Et	"	0.11 NMR(CDCl <sub>3</sub> ): δ=0.66~1.12(6H, m), 1.3~1.9(4H, m), 1.95~2.30(2H, t), 3.67(3H, s), 3.7~4.28(2H, m), 6.69~8.10(10H, m) IR 1720, 1240, 1140, 1030, 760	
434		Me	"	>300	IR 1580, 1380, 1210, 945, 750 2x10 <sup>-8</sup>
435			"	287 ~ 6	IR 1610, 1505, 1380, 950, 750 10 <sup>-7</sup>
436			"	198 ~ 203	IR 1575, 1520, 1445, 1040, 760 10 <sup>-8</sup>
438			-CH(CH <sub>3</sub> ) <sub>2</sub> , H	179 ~ 81	IR 1690, 1565, 1265, 1025, 965

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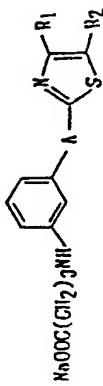
Compound No.	W	R <sub>1</sub> , R <sub>2</sub>	m.p. (°C)	Physical property values	Anti-SRS action [minimum effective conc (M)]
439		-CH(CH <sub>3</sub> ) <sub>2</sub> , H	106 ~ 8	IR 1690, 1590, 1220, 965, 780	2x10 <sup>-9</sup>
440		*	oil	NMR(CDCl <sub>3</sub> ): δ=0.92(6H, t), 1.35(6H, d), 1.62(4H, q), 2.9 ~ 3.6(1H, m), 3.35(2H, s), 6.4 ~ 7.34(7H, m) IR 1685, 1590, 1250, 950, 770	
441		*	129 ~ 30	IR 1680, 1585, 1440, 1210, 750	5x10 <sup>-8</sup>
442		*	95 ~ 6	IR 1665, 1570, 1280, 1200, 950	
443		-CH <sub>2</sub> CH <sub>3</sub> , H	64 ~ 5	IR 1690, 1440, 1260, 955	
444		-CH(CH <sub>3</sub> ) <sub>2</sub> , H	104 ~ 5	IR 1700, 1260, 1200, 1150, 960	

Table 2-10



Compound No.	$\lambda$	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]
368 -COCl <sub>2</sub> -	115~ 7	1660, 1560, 1440, 750		
369 -CH <sub>2</sub> COCl <sub>2</sub> -	67~ 70	1570, 1440, 1355, 750		$10^{-7}$
370 -CONII-	277~ 80	1665, 1540, 1435, 1275, 745		$10^{-8}$
371 -CH=CH-C(=O)NII-	341~ 4	1670, 1545, 1435, 1260, 1070, 745		
372 -NHCOCl <sub>2</sub> -	134~ 8	1660, 1560, 1430, 1305, 850, 735		

Table 2-11



Compound No.	A	R <sub>1</sub> . R <sub>2</sub>	m.p. (°C)	Physical property values (IR)	Anti-SkS action [minimum effective conc. (M)]
376	-((Cl <sub>2</sub> ) <sub>2</sub> -)	环	149~ 50	2800, 1600, 1550, 1430, 1100, 760	5×10 <sup>-7</sup>
377	-CH=Cl-	Me , Me	133~ 5	1600, 1555, 1410, 950, 770	2×10 <sup>-7</sup>
378	"	Me	173~ 82	1560, 1400, 1305, 940, 770	
379	"	Cl	167~ 70	1625, 1510, 1105, 940, 775	
380	"	Cl , H	237~ 9	1560, 1410, 1100, 958, 830, 745	
381	"	Cl , H	205~ 7	1560, 1420, 950, 740, 690	
382	"	Et , Me	144~ 6	1540, 1410, 1330, 950, 765	
383	"	-Cl((Cl) <sub>2</sub> ) <sub>2</sub> , II	125~ 9	1560, 1400, 1300, 940, 765	
384	"	-(Cl <sub>2</sub> )Cl <sub>2</sub> , II	165~ 70	1625, 1530, 1105, 950, 768	
385	"	-(Cl <sub>2</sub> ) <sub>2</sub> Cl <sub>2</sub> , I	154~ 5	1555, 1430, 950, 765	

Compound No.	A	R <sub>1</sub> , R <sub>2</sub>	m.p. (°C)	Physical property values (IR)	Anti-SRS action [minimum effective conc. (M)]
386	-CH=CH-	-C(CH <sub>3</sub> ) <sub>3</sub> .II	155~ 7	1560, 1410, 1100, 950, 745	
387	"	Et . II	138~ 40	1550, 1410, 950, 765	10 <sup>-8</sup>
388	"	-(CH <sub>2</sub> ) <sub>2</sub> OEt . II	133~ 5	1555, 1410, 950, 770, 685	
389	"	-(CH <sub>2</sub> ) <sub>2</sub> OEt . II	123~ 7	1595, 1560, 1435, 1410, 955, 770	10 <sup>-7</sup>
390	"	-(CH <sub>2</sub> ) <sub>5</sub> OEt . II	112~ 5	1560, 1410, 950, 770, 685	
391	"	-(CH <sub>2</sub> ) <sub>6</sub> OEt . II	153~ 4	1550, 1410, 950, 770	
392	-OCl <sub>2</sub> -		125~ 30	1615, 1570, 1210, 750	
393	-Cl <sub>2</sub> OCl <sub>2</sub> -	"	139~ 45	1675, 1600, 1560, 1400, 755	
400	-Cl-OCl-	OEt . II	270~ 6	1600, 1550, 1430, 955, 730	

Table 2-12

Compound No.	Structural Formula	m.p. (°C)	Physical property values (IR)
205	<chem>CC(=O)OC(C)Nc1ccccc1Cc2nc3ccccc3s2</chem>	98 ~ 9	1715, 1600, 1250, 1175, 750
408	<chem>CC(=O)OC(C)Nc1ccccc1Cc2nc3ccccc3s2</chem>	207 ~ 8	1557, 1430, 1165, 1040, 750
420	<chem>CC(=O)OC(C)Nc1ccccc1Cc2nc3ccccc3s2</chem>	221 ~ 5	1660, 1520, 1440, 750
421	<chem>CC(=O)OC(C)Nc1ccccc1Cc2nc3ccccc3s2</chem>	108 ~ 9	1570, 1430, 1085, 750

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Table 3

Test compound		Anti-SRS action
Compound	Example	[Minimum effective conc. (M)]
1	1	$5 \times 10^{-8}$
189	9	$10^{-6}$
199	13	$2 \times 10^{-7}$
213	17	$5 \times 10^{-8}$
396	19	$2 \times 10^{-7}$
414	21	$10^{-6}$
422	23	$10^{-6}$
423	24	$10^{-6}$
424	25	$5 \times 10^{-7}$
426	27	$2 \times 10^{-7}$

Table 4

Test Compound		Airway resistance increase inhibition (%)
Compound No.	Dosage (mg/kg)	
213	30	51
223	3	87
227	3	71
272	10	37
297	10	62
353	30	79
396	3	55

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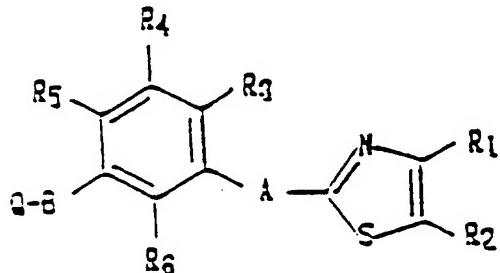
Table 5

Compound No.	Acute toxicity value (LD <sub>50</sub> mg/kg)
2	> 3000
26	> 3000
213	> 3000
216	> 3000
232	3000
247	> 3000
248	> 3000
249	1000 ~ 2000
281	> 3000
300	1000 ~ 2000
303	2000
313	1560
314	2000 ~ 3000
315	1000 ~ 2000
317	1032
324	1360
325	2000

Compound No.	Acute toxicity value (LD <sub>50</sub> mg/kg)
326	> 3000
353	3308
355	1928
382	1928
396	2000 ~ 3000
418	> 3000

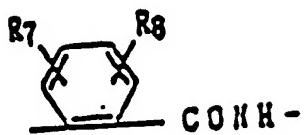
**Claims**

1. A thiazole derivative represented by the following formula and a pharmaceutically acceptable salt thereof:

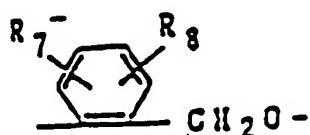


wherein R<sub>1</sub> and R<sub>2</sub> each independently represent a hydrogen atom, an alkyl group having 1 to 8 carbon atoms, a lower alkoxy carbonyl group having 2 to 4 carbon atoms or a phenyl group which is unsubstituted or substituted with a halogen atom, a lower alkoxy group having 1 to 3 carbon atoms, a lower alkoxy carbonyl group having 2 to 4 carbon atoms or an alkyl group of 1 to 3 carbon atoms or cooperatively represent a tetramethylene group corresponding to a fused cyclohexane ring or a butadienylene group which is unsubstituted or substituted with a halogen atom, a lower alkoxy group having 1 to 3 carbon atoms, a lower alkoxy carbonyl group having 2 to 4 carbon atoms or an alkyl group having 1 to 3 carbon atoms corresponding to a fused benzene ring; R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> and R<sub>6</sub> each independently represent a hydrogen atom, a hydroxyl group, a lower alkoxy group having 1 to 3 carbon atoms, an alkyl group having 1 to 3 carbon atoms or a halogen atom; A is a linking group selected from the group consisting of -CH=CH-, -CH<sub>2</sub>CH<sub>2</sub>- -OCH<sub>2</sub>, -NHCH<sub>2</sub>-, -CONH-, -CH=CHCONH and -CH<sub>2</sub>OCH<sub>2</sub>-,

B is a group selected from the group consisting of:  
-(CH<sub>2</sub>)<sub>n</sub>-CONH-, wherein n is an integer of 0-3,  
-(CH<sub>2</sub>)<sub>n</sub>-NH-, wherein n is an integer of 1-4,  
-(CH<sub>2</sub>)<sub>n</sub>-O-, wherein n is an integer of 1-4,  
-(CH<sub>2</sub>)<sub>n</sub>-, wherein n is an integer of 2-5,

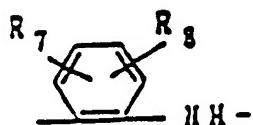


wherein R<sub>7</sub> and R<sub>8</sub> each independently represents a hydrogen atom or an alkyl group having 1 to 3 carbon atoms as defined above,



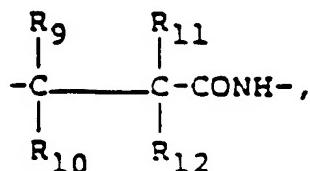
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wherein R<sub>7</sub> and R<sub>8</sub> have the same meanings as defined above,



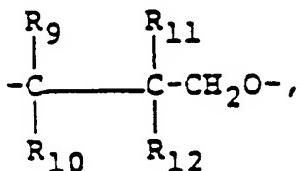
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wherein R<sub>7</sub> and R<sub>8</sub> have the same meanings as defined above,



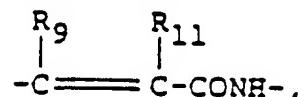
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wherein R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> and R<sub>12</sub> each independently represent a hydrogen atom, a phenyl group or an alkyl group having 1 to 6 carbon atoms,



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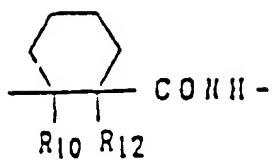
wherein R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> and R<sub>12</sub> have the same meanings as defined above,



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wherein R<sub>9</sub> and R<sub>11</sub> have the same meanings as defined above,

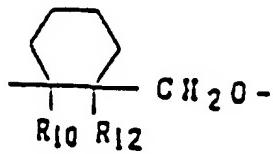
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wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above,

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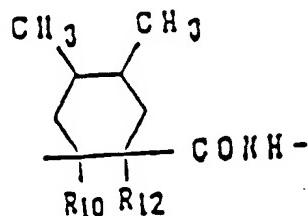
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wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above,

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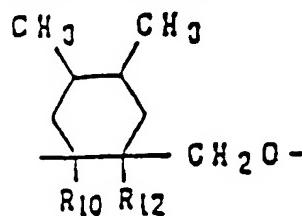
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wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above,

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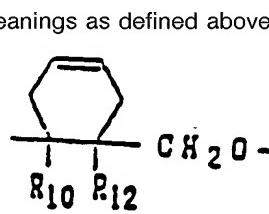
40 wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above,

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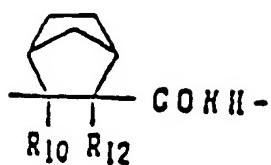
wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above,

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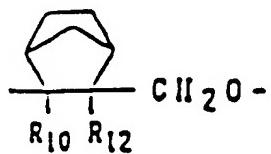
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wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above,

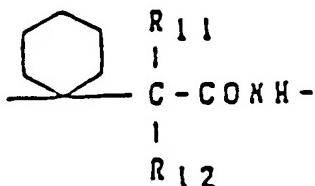


wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above,



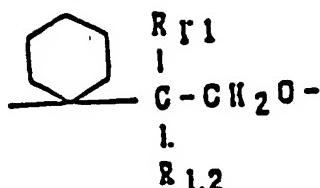
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wherein R<sub>10</sub> and R<sub>12</sub> have the same meanings as defined above,



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wherein R<sub>11</sub> and R<sub>12</sub> have the same meanings as defined above, and

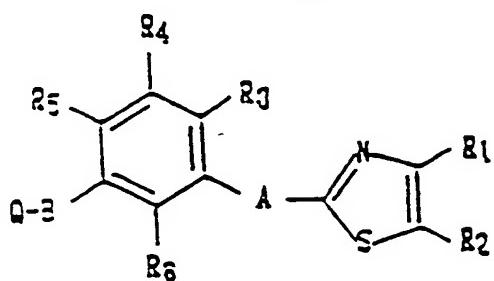


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wherein R<sub>11</sub> and R<sub>12</sub> have the same meanings as defined above and Q represents a carboxyl group, a lower alkoxy group having 1 to 3 carbon atoms, a hydroxyl group, an alkoxy carbonyl group having 2 to 6 carbon atoms or a 5-tetrazolyl group.

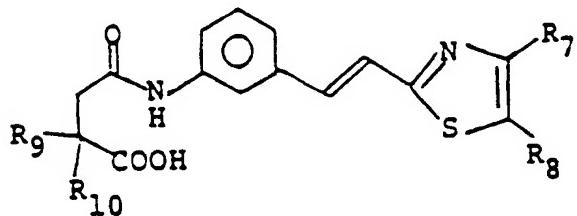
- 45
2. A leukotriene antagonist comprising a thiazole derivative represented by the following formula or a pharmaceutically acceptable salt thereof as the active ingredient:



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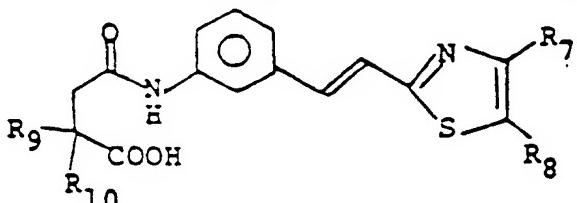
wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, A, B and Q are defined in Claim 1.

3. A thiazole derivative and the pharmaceutically acceptable salt thereof according to Claim 1 represented by the following formula:



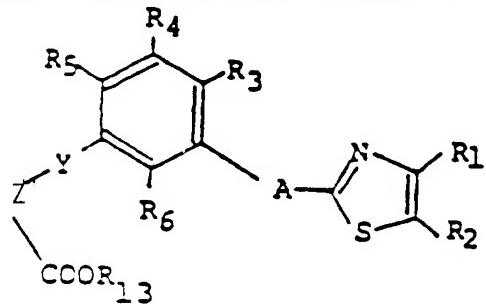
wherein R<sub>7</sub> and R<sub>8</sub> each independently represent a hydrogen atom, an alkyl group having 1 to 8 carbon atoms or cooperatively represent a butadienylene group which is unsubstituted or substituted with a halogen atom, a lower alkoxy group having 1 to 3 carbon atoms, a lower alkoxy carbonyl group having 2 to 4 carbon atoms or an alkyl group having 1 to 3 carbon atoms corresponding to a fused benzene ring; R<sub>9</sub> and R<sub>10</sub> each independently represent a hydrogen atom or an alkyl group having 1 to 6 carbon atoms.

- 20 4. A leukotriene antagonist comprising a thiazole derivative represented by the following formula or a pharmaceutically acceptable salt thereof according to Claim 2 as the active ingredient:

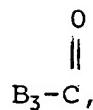


wherein  $R_7$ ,  $R_8$ ,  $R_9$ ,  $R_{10}$ , are defined in Claim 3.

5. A process for preparing a thiazole derivative represented by the formula:



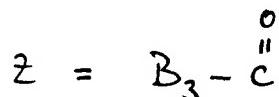
wherein R<sub>1</sub> and R<sub>2</sub> each independently represent a hydrogen atom, an alkyl group having 1 to 8 carbon atoms, a lower alkoxy carbonyl group having 2 to 4 carbon atoms or a phenyl group which is unsubstituted or substituted with a halogen atom, a lower alkoxy group having 1 to 3 carbon atoms, a lower alkoxy carbonyl group having 2 to 4 carbon atoms or an alkyl group of 1 to 3 carbon atoms or cooperatively represent a tetramethylene group corresponding to a fused cyclohexane ring or a butadienylene group which is unsubstituted or substituted with a halogen atom, a lower alkoxy group having 1 to 3 carbon atoms, a lower alkoxy carbonyl group having 2 to 4 carbon atoms or an alkyl group having 1 to 3 carbon atoms corresponding to a fused benzene ring; R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> and R<sub>6</sub> each independently represent a hydrogen atom, a hydroxyl group, a lower alkoxy group having 1 to 3 carbon atoms, an alkyl group having 1 to 3 carbon atoms or a halogen atom; R<sub>13</sub> represents an alkyl group having 1 to 5 carbon atoms; A is a linking group selected from group consisting of -CH=CH-, -CH<sub>2</sub>CH<sub>2</sub>- , -OCH<sub>2</sub>- , -NHCH<sub>2</sub>- , -CONH- , -CH=CHCONH and -CH<sub>2</sub>OCH<sub>2</sub>- , Z represents B<sub>4</sub> or



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wherein  $\text{B}_4$  represents a linking group having 1 to 4 carbon atoms and  $\text{B}_3$  represents a direct bond or a linking group having 1 to 3 carbon atoms with the proviso that if

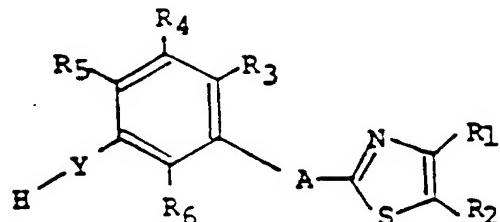
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than  $\text{Y} = \text{NH}$ ;  $\text{Y}$  represents oxygen or -NH or a pharmaceutically acceptable salt thereof, which comprises reacting a compound represented by the formula:

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wherein  $\text{R}_1$ ,  $\text{R}_2$ ,  $\text{R}_3$ ,  $\text{R}_4$ ,  $\text{R}_5$ ,  $\text{R}_6$ ,  $\text{A}$  and  $\text{Y}$  are the same as defined above, with a compound selected from the group of the following (I)-(K) formulae:

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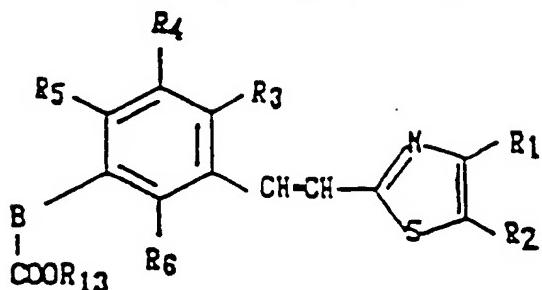
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wherein  $\text{X}$  is a halogen atom,  $\text{B}_3$  and  $\text{B}_4$ , are the same as defined above with the proviso that  $\text{B}_3$  is not a direct bond in formula (K) and (J) and (K) can be optionally subjected further to hydrolysis to obtain an acid salt and (I) and (J) can be optionally subjected further to esterification.

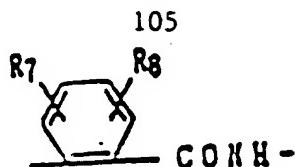
6. A process for preparing a thiazole derivative represented by the formula:



15 wherein R<sub>1</sub> and R<sub>2</sub> each independently represent a hydrogen atom, an alky group having 1 to 8 carbon atoms, a lower alkoxy carbonyl group having 2 to 4 carbon atoms or a phenyl group or cooperatively represent a tetramethylene group corresponding to a fused cyclohexane ring or a butadienylene group which is unsubstituted or substituted with a halogen atom, a lower alkoxy group having 1 to 3 carbon atoms, a lower alkoxy carbonyl group having 2 to 4 carbon atoms or an alkyl group having 1 to 3 carbon atoms corresponding to a fused benzene ring; R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> and R<sub>6</sub> each independently represent a hydrogen atom, a hydroxyl group, a lower alkoxy group having 1 to 3 carbon atoms, a alkyl group having 1 to 3 carbon atoms or a halogen atom; R<sub>13</sub> represents an alkyl group having 1 to 5 carbon atoms;

20 B is a group selected from the group consisting of:

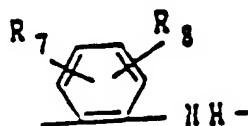
- (CH<sub>2</sub>)<sub>n</sub>-CONH-, wherein n is an integer of 0-3,
- (CH<sub>2</sub>)<sub>n</sub>-NH-, wherein n is an integer of 1-4,
- (CH<sub>2</sub>)<sub>n</sub>-O-, wherein n is an integer of 1-4,
- (CH<sub>2</sub>)<sub>n</sub>-, wherein n is an integer of 2-5,



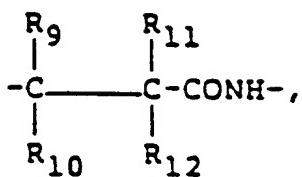
35 wherein R<sub>7</sub> and R<sub>8</sub> each independently represents a hydrogen atom or an alkyl group having 1 to 3 carbon atoms as defined above,



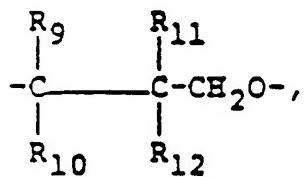
45 wherein R<sub>7</sub> and R<sub>8</sub> have the same meanings as defined above,



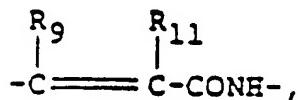
wherein R<sub>7</sub> and R<sub>8</sub> have the same meanings as defined above,



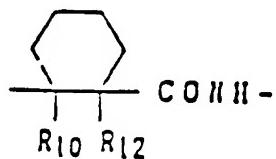
10 wherein  $\text{R}_9$ ,  $\text{R}_{10}$ ,  $\text{R}_{11}$  and  $\text{R}_{12}$  each independently represent a hydrogen atom, a phenyl group or an alkyl group having 1 to 6 carbon atoms,



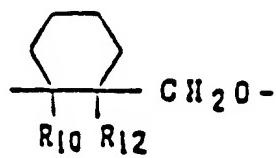
20 wherein  $\text{R}_9$ ,  $\text{R}_{10}$ ,  $\text{R}_{11}$  and  $\text{R}_{12}$  have the same meanings as defined above,



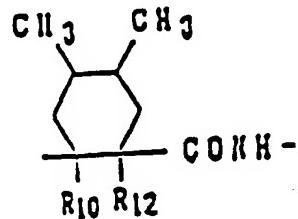
wherein  $\text{R}_9$  and  $\text{R}_{11}$  have the same meanings as defined above,



35 wherein  $\text{R}_{10}$  and  $\text{R}_{12}$  have the same meanings as defined above,

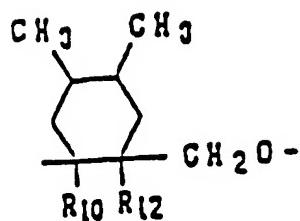


45 wherein  $\text{R}_{10}$  and  $\text{R}_{12}$  have the same meanings as defined above,



55 wherein  $\text{R}_{10}$  and  $\text{R}_{12}$  have the same meanings as defined above,

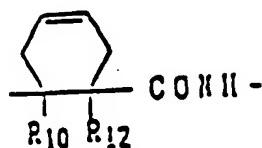
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wherein  $\text{R}_{10}$  and  $\text{R}_{12}$  have the same meanings as defined above,

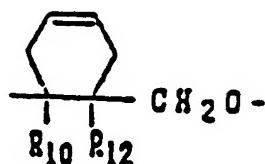
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wherein  $\text{R}_{10}$  and  $\text{R}_{12}$  have the same meanings as defined above,

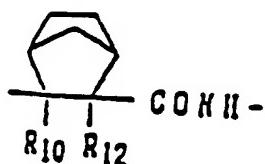
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wherein  $\text{R}_{10}$  and  $\text{R}_{12}$  have the same meanings as defined above,

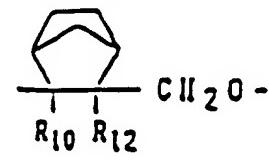
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wherein  $\text{R}_{10}$  and  $\text{R}_{12}$  have the same meanings as defined above,

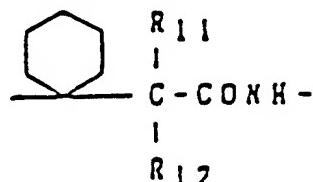
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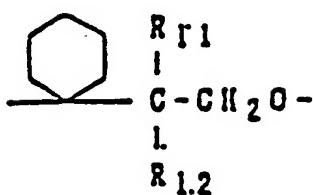
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wherein  $\text{R}_{10}$  and  $\text{R}_{12}$  have the same meanings as defined above,

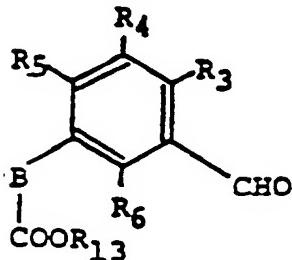
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wherein  $\text{R}_{11}$  and  $\text{R}_{12}$  have the same meanings as defined above, and



10 or a pharmaceutically acceptable salt thereof, which comprises reacting a compound represented by the formula:



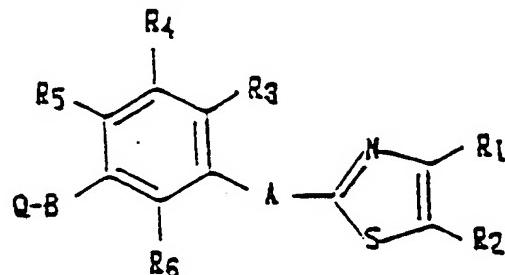
wherein R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>13</sub> and B are the same as defined above, with a compound represented by the formula:



wherein R<sub>1</sub> and R<sub>2</sub> are the same as defined above, and optionally subjecting further the thus obtained product to hydrolysis to obtain an acid or salt

35 Patentansprüche

1. Thiazolderivat, dargestellt durch die folgende Formel und eines ihrer pharmazeutisch zulässigen Salze:



50 worin R<sub>1</sub> und R<sub>2</sub> jeweils unabhängig ein Wasserstoffatom, eine Alkylgruppe mit 1 bis 8 Kohlenstoffatomen, eine Niederalkoxycarbonylgruppe mit 2 bis 4 Kohlenstoffatomen oder eine Phenylgruppe, die unsubstituiert oder substituiert mit einem Halogenatom, einer Niederalkoxygruppe mit 1 bis 3 Kohlenstoffatomen, einer Niederalkoxycarbonylgruppe mit 2 bis 4 Kohlenstoffatomen oder einer Alkylgruppe mit 1 bis 3 Kohlenstoffatomen ist, darstellen, oder gemeinsam eine Tetramethylengruppe darstellen, was einem aneliierten Cyclohexanring entspricht, oder eine Butadienylengruppe darstellen, die unsubstituiert oder substituiert mit einem Halogenatom, einer Niederalkoxygruppe mit 1 bis 3 Kohlenstoffatomen, einer Niederalkoxycarbonylgruppe mit 2 bis 4 Kohlenstoffatomen oder einer Alkylgruppe mit 1 bis 3 Kohlenstoffatomen ist, was einem aneliierten Benzolring entspricht; R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> und R<sub>6</sub> jeweils

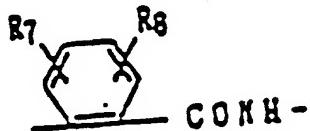
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EP 0 219 436 B1

unabhängig ein Wasserstoffatom, eine Hydroxylgruppe, eine Niederalkoxygruppe mit 1 bis 3 Kohlenstoffatomen, eine Alkylgruppe mit 1 bis 3 Kohlenstoffatomen oder ein Halogenatom darstellen; A eine verbindende Gruppe ist, ausgewählt aus der Gruppe, bestehend aus  $-\text{CH}=\text{CH}-$ ,  $-\text{CH}_2\text{CH}_2-$ ,  $-\text{OCH}_2-$ ,  $-\text{NHCH}_2-$ ,  $-\text{CONH}-$ ,  $-\text{CH}=\text{CHCONH}$  und  $-\text{CH}_2\text{OCH}_2-$ , B eine Gruppe ist, die ausgewählt ist aus der Gruppe, bestehend aus:  $-(\text{CH}_2)_n\text{CONH}-$ , wobei n eine ganze Zahl von 0 bis 3 ist,  $-(\text{CH}_2)_n\text{NH}-$ , wobei n eine ganze Zahl von 1 bis 4 ist,  $-(\text{CH}_2)_n\text{O}-$ , wobei n eine ganze Zahl von 1 bis 4 ist,  $-(\text{CH}_2)_n-$ , wobei n eine ganze Zahl von 2 bis 5 ist,

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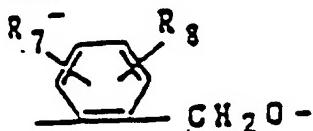
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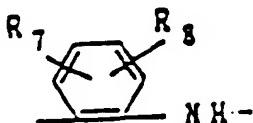
worin  $\text{R}_7$  und  $\text{R}_8$  jeweils unabhängig ein Wasserstoffatom oder eine Alkylgruppe mit 1 bis 3 Kohlenstoffatomen, wie oben definiert, darstellen,

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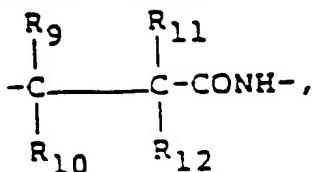
worin  $\text{R}_7$  und  $\text{R}_8$  dieselben Bedeutungen wie oben haben,



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worin  $\text{R}_7$  und  $\text{R}_8$  dieselben Bedeutungen wie oben haben,

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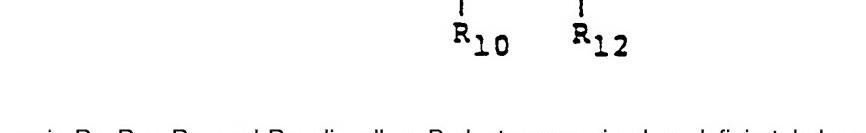


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worin  $\text{R}_9$ ,  $\text{R}_{10}$ ,  $\text{R}_{11}$  und  $\text{R}_{12}$  jeweils unabhängig ein Wasserstoffatom, eine Phenylgruppe oder eine Alkylgruppe mit 1 bis 6 Kohlenstoffatomen darstellen

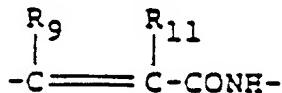
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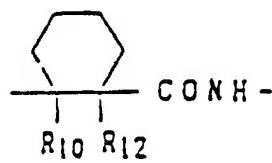


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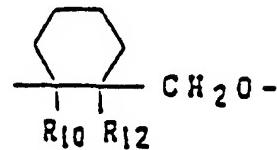
worin  $\text{R}_9$ ,  $\text{R}_{10}$ ,  $\text{R}_{11}$  und  $\text{R}_{12}$  dieselben Bedeutungen, wie oben definiert, haben,



worin  $\text{R}_9$  und  $\text{R}_{11}$  dieselben Bedeutungen wie oben haben,

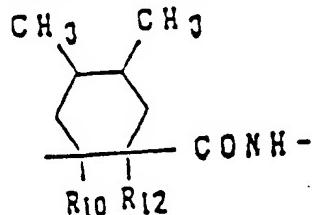


worin  $\text{R}_{10}$  und  $\text{R}_{12}$  dieselben Bedeutungen wie oben haben,



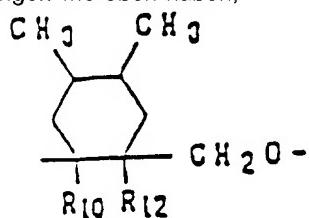
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worin  $\text{R}_{10}$  und  $\text{R}_{12}$  dieselben Bedeutungen wie oben haben,



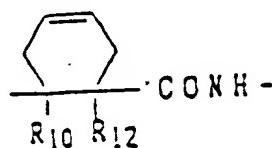
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worin  $\text{R}_{10}$  und  $\text{R}_{12}$  dieselben Bedeutungen wie oben haben,



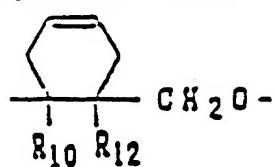
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worin  $\text{R}_{10}$  und  $\text{R}_{12}$  dieselben Bedeutungen wie oben haben,



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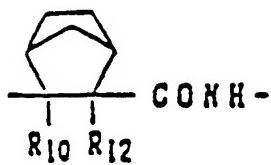
worin  $\text{R}_{10}$  und  $\text{R}_{12}$  dieselben Bedeutungen wie oben haben,



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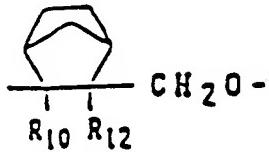
worin  $\text{R}_{10}$  und  $\text{R}_{12}$  dieselben Bedeutungen wie oben haben,

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worin  $R_{10}$  und  $R_{12}$  dieselben Bedeutungen wie oben haben,

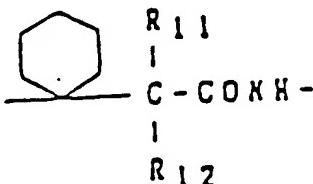
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worin  $R_{10}$  und  $R_{12}$  dieselben Bedeutungen wie oben haben,

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worin  $R_{11}$  und  $R_{12}$  dieselben Bedeutungen wie oben haben, und

30



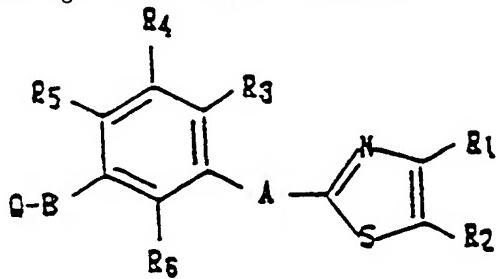
35

worin  $R_{11}$  und  $R_{12}$  dieselben Bedeutungen wie oben haben und Q eine Carboxylgruppe, eine Niederalkoxygruppe mit 1 bis 3 Kohlenstoffatomen, eine Hydroxylgruppe, eine Alkoxy carbonylgruppe mit 2 bis 6 Kohlenstoffatomen oder eine 5-Tetrazolylgruppe darstellt.

40

2. Ein Leukotrien-Antagonist, umfassend ein Thiazolderivat, dargestellt durch die folgende Formel, oder eines ihrer pharmazeutisch zulässigen Salze als aktiven Bestandteil:

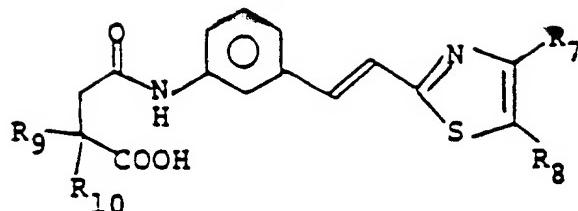
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55 worin  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ , A, B und Q wie in Anspruch 1 definiert sind.

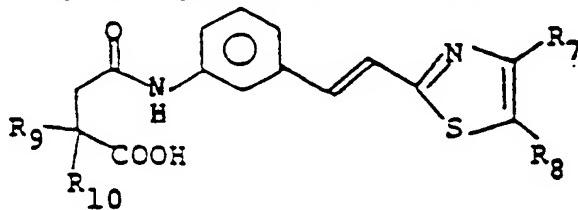
3. Thiazolderivat und ihre pharmazeutisch zulässigen Salze gemäss Anspruch 1, dargestellt durch die folgende Formel:



10 worin R<sub>7</sub> und R<sub>8</sub> jeweils unabhängig ein Wasserstoffatom, eine Alkylgruppe mit 1 bis 8 Kohlenstoffatomen darstellen oder zusammen eine Butadienylengruppe darstellen, die unsubstituiert oder substituiert mit einem Halogenatom, einer Niederalkoxygruppe mit 1 bis 3 Kohlenstoffatomen, einer Niederalkoxycarbonylgruppe mit 2 bis 4 Kohlenstoffatomen oder einer Alkylgruppe mit 1 bis 3 Kohlenstoffatomen ist, was einem anellierten Benzolring entspricht; R<sub>9</sub> und R<sub>10</sub> jeweils unabhängig ein Wasserstoffatom oder eine Alkylgruppe mit 1 bis 6 Kohlenstoffatomen darstellen.

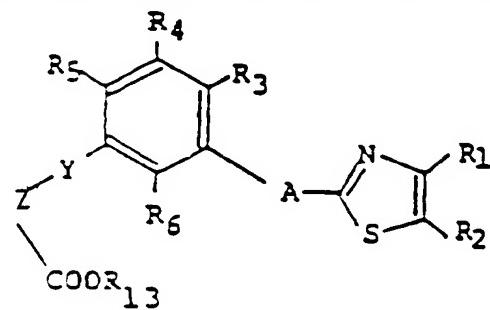
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4. Leukotrien-Antagonist, umfassend ein durch die folgende Formel dargestelltes Thiazolderivat oder eines seiner pharmazeutisch zulässigen Salze gemäß Anspruch 2, als aktiven Bestandteil:



worin R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub> und R<sub>10</sub> in Anspruch 3 definiert sind.

- 30 5. Verfahren zur Herstellung eines Thiazolderivats, dargestellt durch die Formel:



45 worin R<sub>1</sub> und R<sub>2</sub> jeweils unabhängig ein Wasserstoffatom, eine Alkylgruppe mit 1 bis 8 Kohlenstoffatomen, eine Niederalkoxycarbonylgruppe mit 2 bis 4 Kohlenstoffatomen, oder eine Phenylgruppe, die unsubstituiert oder substituiert mit einem Halogenatom, einer Niederalkoxygruppe mit 1 bis 3 Kohlenstoffatomen, einer Niederalkoxycarbonylgruppe mit 2 bis 4 Kohlenstoffatomen oder einer Alkylgruppe mit 1 bis 3 Kohlenstoffatomen ist, darstellen oder gemeinsam eine Tetramethylengruppe darstellen, was einem anellierten Cyclohexanring entspricht, oder eine Butadienylengruppe darstellen, die unsubstituiert oder substituiert mit einem Halogenatom, einer Niederalkoxygruppe mit 1 bis 3 Kohlenstoffatomen, einer Niederalkoxycarbonylgruppe mit 2 bis 4 Kohlenstoffatomen oder einer Alkylgruppe mit 1 bis 3 Kohlenstoffatomen ist, was einem anellierten Benzolring entspricht; R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> und R<sub>6</sub> jeweils unabhängig ein Wasserstoffatom, eine Hydroxylgruppe, eine Niederalkoxygruppe mit 1 bis 3 Kohlenstoffatomen, eine Alkylgruppe mit 1 bis 3 Kohlenstoffatomen oder ein Halogenatom darstellen; R<sub>13</sub> eine Alkylgruppe mit 1 bis 5 Kohlenstoffatom darstellt; A eine verbindende Gruppe ist, die ausgewählt ist aus der Gruppe, bestehend aus -CH=CH-, -CH<sub>2</sub>CH<sub>2</sub>-, -OCH<sub>2</sub>-, -NHCH<sub>2</sub>-, -CONH-, -CH=CHCONH und -CH<sub>2</sub>OCH<sub>2</sub>-; Z B<sub>4</sub> oder

50

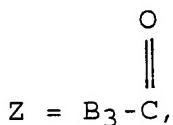
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darstellt, wobei  $\text{B}_4$  eine verbindende Gruppe mit 1 bis 4 Kohlenstoffatomen darstellt und  $\text{B}_3$  eine direkte Bindung oder eine verbindende Gruppe mit 1 bis 3 Kohlenstoffatomen darstellt, mit der Massgabe, dass, wenn

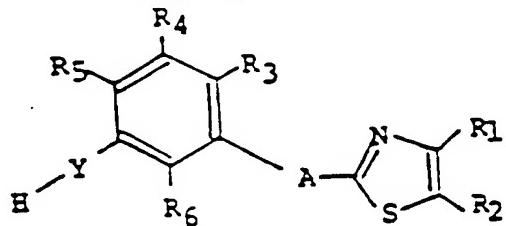
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dann  $\text{Y} = \text{NH}$  ist,  $\text{Y}$  Sauerstoff oder  $-\text{NH}$  darstellt oder eines seiner pharmazeutisch zulässigen Salze, umfassend die Umsetzung einer Verbindung, dargestellt durch die Formel:

20



25

worin  $\text{R}_1$ ,  $\text{R}_2$ ,  $\text{R}_3$ ,  $\text{R}_4$ ,  $\text{R}_5$ ,  $\text{R}_6$ ,  $\text{A}$  und  $\text{Y}$  wie oben definiert sind, mit einer Verbindung, ausgewählt aus der Gruppe der folgenden Formeln (I) bis (K):

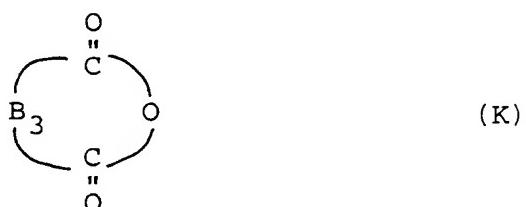
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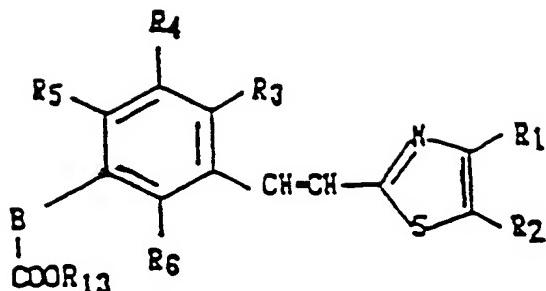


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worin  $\text{X}$  ein Halogenatom ist,  $\text{B}_3$  und  $\text{B}_4$  wie oben definiert sind, mit der Massgabe, dass  $\text{B}_3$  keine direkte Bindung in Formel (K) ist, und (J) und (K) wahlweise weiterhin der Hydrolyse unterworfen werden können, so dass ein Säuresalz erhalten wird, und (I) und (J) wahlweise weiterhin der Veresterung unterworfen werden können.

55

6. Verfahren zur Herstellung eines Thiazolderivats, dargestellt durch die Formel



worin R<sub>1</sub> und R<sub>2</sub> jeweils unabhängig ein Wasserstoffatom, eine Alkylgruppe mit 1 bis 8 Kohlenstoffatomen, eine Niederalkoxycarbonylgruppe mit 2 bis 4 Kohlenstoffatomen, oder eine Phenylgruppe darstellen oder gemeinsam eine Tetramethylengruppe darstellen, was einem anellierten Cyclohexanring entspricht, oder eine Butadienylengruppe darstellen, die unsubstituiert oder substituiert mit einem Halogenatom, einer Niederalkoxygruppe mit 1 bis 3 Kohlenstoffatomen, einer Niederalkoxycarbonylgruppe mit 2 bis 4 Kohlenstoffatomen oder einer Alkylgruppe mit 1 bis 3 Kohlenstoffatomen ist, was einem anellierten Benzolring entspricht; R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> und R<sub>6</sub> jeweils unabhängig ein Wasserstoffatom, eine Hydroxylgruppe, eine Niederalkoxygruppe mit 1 bis 3 Kohlenstoffatomen, eine Alkylgruppe mit 1 bis 3 Kohlenstoffatomen oder ein Halogenatom darstellen; R<sub>13</sub> eine Alkylgruppe mit 1 bis 5 Kohlenstoffatomen darstellt;

15

B eine Gruppe ist, die ausgewählt ist aus der Gruppe, bestehend aus: -(CH<sub>2</sub>)<sub>n</sub>-CONH-, wobei n eine ganze Zahl von 0 bis 3 ist, -(CH<sub>2</sub>)<sub>n</sub>-NH-, wobei n eine ganze Zahl von 1 bis 4 ist, -(CH<sub>2</sub>)<sub>n</sub>-O-, wobei n eine ganze Zahl von 1 bis 4 ist, -(CH<sub>2</sub>)<sub>n</sub>-O-, wobei n eine ganze Zahl von 2 bis 5 ist,

20

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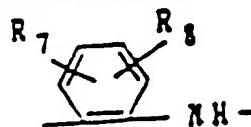


worin R<sub>7</sub> und R<sub>8</sub> jeweils unabhängig ein Wasserstoffatom oder eine Alkylgruppe mit 1 bis 3 Kohlenstoffatomen, wie oben definiert, darstellen,



40

worin R<sub>7</sub> und R<sub>8</sub> dieselben Bedeutungen wie oben haben,



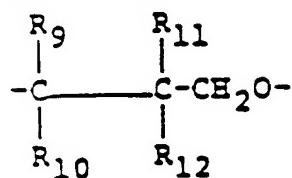
worin R<sub>7</sub> und R<sub>8</sub> dieselben Bedeutungen wie oben haben,



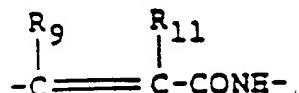
worin R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> und R<sub>12</sub> jeweils unabhängig ein Wasserstoffatom, eine Phenylgruppe oder eine

Alkylgruppe mit 1 bis 6 Kohlenstoffatomen darstellen

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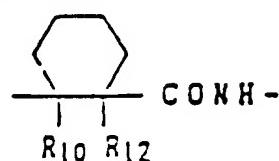
10 worin  $R_9$ ,  $R_{10}$ ,  $R_{11}$  und  $R_{12}$  dieselben Bedeutungen, wie oben haben,



15

worin  $R_9$  und  $R_{11}$  dieselben Bedeutungen wie oben haben,

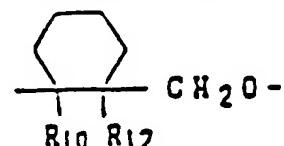
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worin  $R_{10}$  und  $R_{12}$  dieselben Bedeutungen wie oben haben,

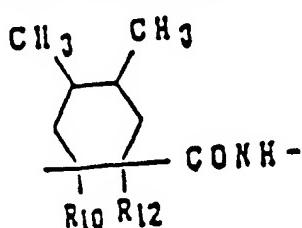
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worin  $R_{10}$  und  $R_{12}$  dieselben Bedeutungen wie oben haben,

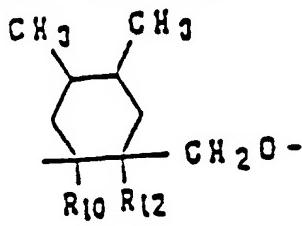
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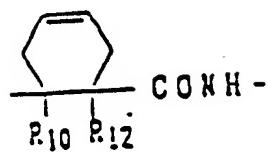
worin  $R_{10}$  und  $R_{12}$  dieselben Bedeutungen wie oben haben,

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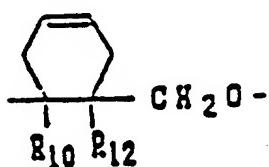


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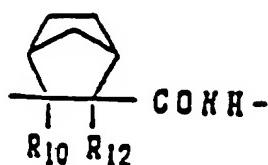
worin  $R_{10}$  und  $R_{12}$  dieselben Bedeutungen wie oben haben,



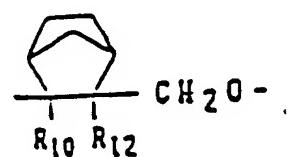
worin R<sub>10</sub> und R<sub>12</sub> dieselben Bedeutungen wie oben haben,



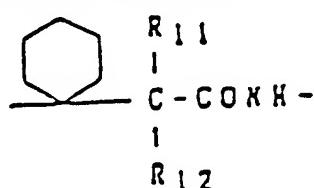
worin R<sub>10</sub> und R<sub>12</sub> dieselben Bedeutungen wie oben haben,



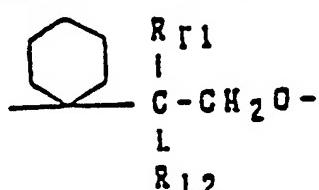
worin R<sub>10</sub> und R<sub>12</sub> dieselben Bedeutungen wie oben haben,



worin R<sub>10</sub> und R<sub>12</sub> dieselben Bedeutungen wie oben haben,

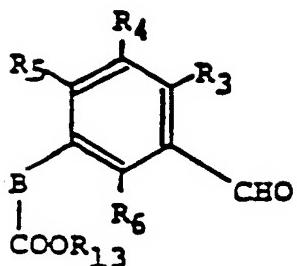


worin R<sub>11</sub> und R<sub>12</sub> dieselben Bedeutungen wie oben haben, und



worin R<sub>11</sub> und R<sub>12</sub> dieselben Bedeutungen wie oben haben, oder eines seiner pharmazeutisch annehmbaren Salze,  
umfassend die Umsetzung einer Verbindung, dargestellt durch die Formel:

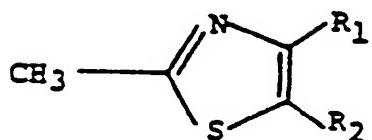
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worin R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>13</sub> und B wie oben definiert sind, mit einer Verbindung, dargestellt durch die Formel:

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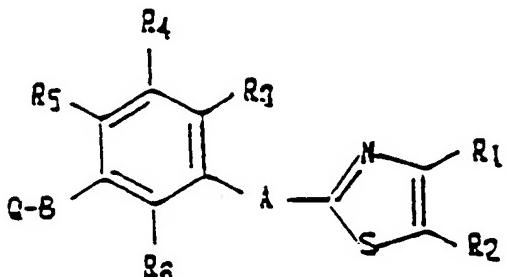
worin R<sub>1</sub> und R<sub>2</sub> wie oben definiert sind, und wahlweise weiterhin Hydrolyse des so erhaltenen Produkts zum Erhalt einer Säure oder eines Salzes.

### Revendications

25

- Dérivé du thiazole représenté par la formule suivante, et ses sels pharmaceutiquement acceptables:

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dans laquelle R<sub>1</sub> et R<sub>2</sub> représentent chacun indépendamment un atome d'hydrogène, un groupe alkyle ayant 1 à 8 atomes de carbone, un groupe alcoxycarbonyle inférieur ayant 2 à 4 atomes de carbone ou un groupe phényle qui est insubstitué ou substitué par un atome d'halogène, un groupe alkoxy inférieur ayant 1 à 3 atomes de carbone, un groupe alcoxycarbonyle inférieur ayant 2 à 4 atomes de carbone ou un groupe alkyle de 1 à 3 atomes de carbone, ou représentent ensemble un groupe tétraméthylène correspondant à un noyau cyclohexane fusionné ou un groupe butadiényle qui est insubstitué ou substitué par un atome d'halogène, un groupe alcoxy inférieur ayant 1 à 3 atomes de carbone, un groupe alcoxycarbonyle inférieur ayant 2 à 4 atomes de carbone ou un groupe alkyle ayant 1 à 3 atomes de carbone correspondant à un noyau benzène fusionné; R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> et R<sub>6</sub> représentent chacun indépendamment un atome d'hydrogène, un groupe hydroxyle, un groupe alkoxy inférieur ayant 1 à 3 atomes de carbone, un groupe alkyle ayant 1 à 3 atomes de carbone ou un atome d'halogène;

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A est un groupe de liaison choisi dans le groupe constitué par -CH=CH-, -CH<sub>2</sub>CH<sub>2</sub>-, -OCH<sub>2</sub>-, -NHCH<sub>2</sub>-, -CONH-, -CH=CHCONH, et -CH<sub>2</sub>OCH<sub>2</sub>-;

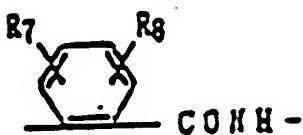
B est un groupe choisi dans le groupe constitué par :

-(CH<sub>2</sub>)<sub>n</sub>-CONH- où n est un entier de 0 à 3,

-(CH<sub>2</sub>)<sub>n</sub>-NH- où n est un entier de 1 à 4,

-(CH<sub>2</sub>)<sub>n</sub>-O- où n est un entier de 1 à 4,

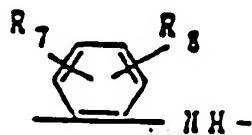
-(CH<sub>2</sub>)<sub>n</sub>- où n est un entier de 2 à 5,



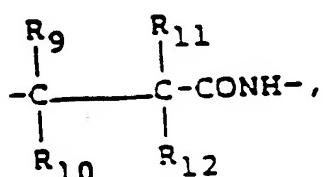
10 dans laquelle R<sub>7</sub> et R<sub>8</sub> représentent chacun indépendamment un atome d'hydrogène ou un groupe alkyle ayant 1 à 3 atomes de carbone comme défini ci-dessus,



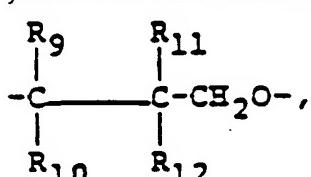
20 dans laquelle R<sub>7</sub> et R<sub>8</sub> ont les mêmes significations que celles définies ci-dessus,



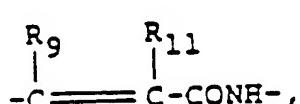
30 dans laquelle R<sub>7</sub> et R<sub>8</sub> ont les mêmes significations que celles définies ci-dessus,



40 dans laquelle R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> et R<sub>12</sub> représentent chacun indépendamment un atome d'hydrogène, un groupe phényle ou un groupe alkyle ayant 1 à 6 atomes de carbone,

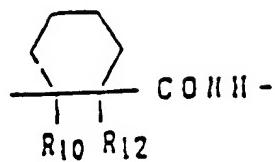


50 dans laquelle R<sub>9</sub>, R<sub>10</sub>, R<sub>11</sub> et R<sub>12</sub> ont les mêmes significations que celles définies ci-dessus,



55 dans laquelle R<sub>9</sub> et R<sub>11</sub> ont les mêmes significations que celles définies ci-dessus,

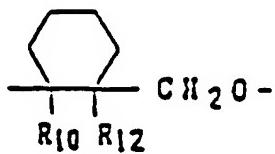
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dans laquelle R<sub>10</sub> et R<sub>12</sub> ont les mêmes significations que celles définies ci-dessus,

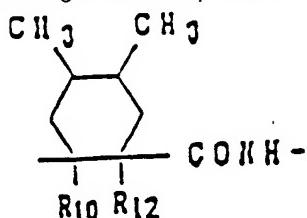
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dans laquelle R<sub>10</sub> et R<sub>12</sub> ont les mêmes significations que celles définies ci-dessus,

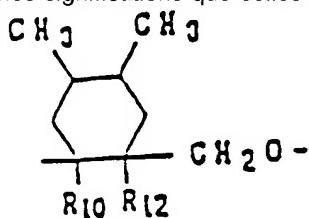
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dans laquelle R<sub>10</sub> et R<sub>12</sub> ont les mêmes significations que celles définies ci-dessus,

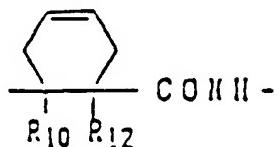
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dans laquelle R<sub>10</sub> et R<sub>12</sub> ont les mêmes significations que celles définies ci-dessus,

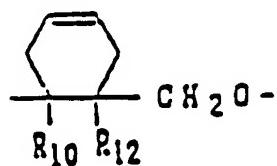
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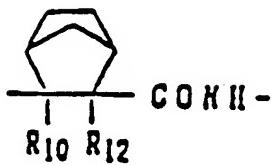
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dans laquelle R<sub>10</sub> et R<sub>12</sub> ont les mêmes significations que celles définies ci-dessus,

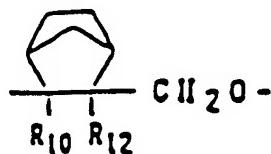
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dans laquelle R<sub>10</sub> et R<sub>12</sub> ont les mêmes significations que celles définies ci-dessus,

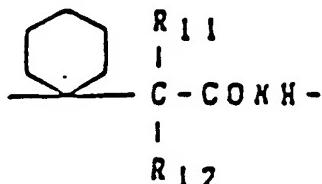


dans laquelle  $\text{R}_{10}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,



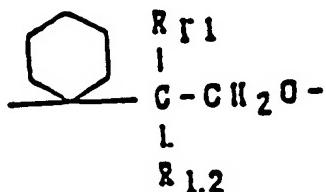
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dans laquelle  $\text{R}_{10}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,



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dans laquelle  $\text{R}_{11}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus, et

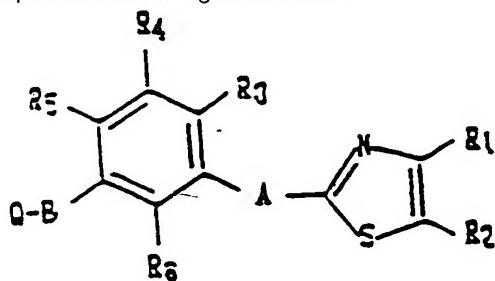


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dans laquelle  $\text{R}_{11}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus, et Q représente un groupe carboxyle, un groupe alcoxy inférieur ayant 1 à 3 atomes de carbone, un groupe hydroxyle, un groupe alcoxycarbonyle ayant 2 à 6 atomes de carbone ou un groupe 5-tétrazolyle.

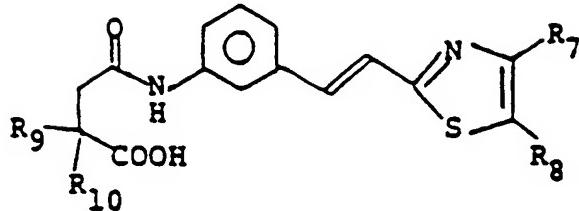
- 45
2. Antagoniste de leucotriène comprenant un dérivé de thiazole représenté par la formule suivante ou un sel pharmaceutiquement acceptable comme ingrédient actif :



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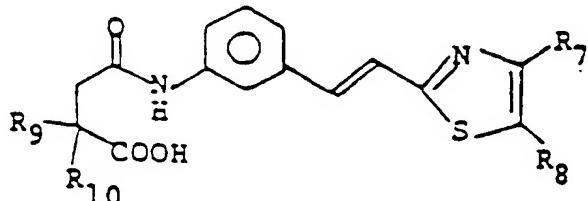
dans laquelle  $\text{R}_1$ ,  $\text{R}_2$ ,  $\text{R}_3$ ,  $\text{R}_4$ ,  $\text{R}_5$ ,  $\text{R}_6$ , A, B et Q sont définis comme dans la revendication 1.

3. Dérivé du thiazole et ses sels pharmaceutiquement acceptables selon la revendication 1, représenté par la formule suivante



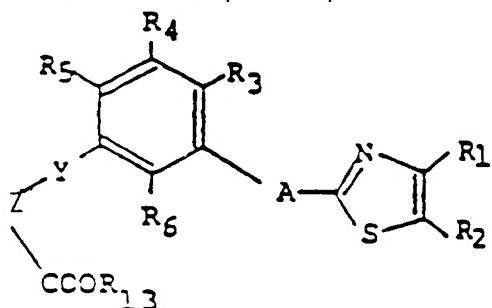
dans laquelle R<sub>7</sub> et R<sub>8</sub> représentent chacun indépendamment un atome d'hydrogène, un groupe alkyle ayant 1 à 8 atomes de carbone ou représentent ensemble un groupe butadiényle qui est insubstitué ou substitué par un atome d'halogène, un groupe alcoxy inférieur ayant 1 à 3 atomes de carbone, un groupe alcoxycarbonyle inférieur ayant 2 à 4 atomes de carbone ou un groupe alkyle ayant 1 à 3 atomes de carbone correspondant à un noyau benzène fusionné; R<sub>9</sub> et R<sub>10</sub> représentent chacun indépendamment un atome d'hydrogène ou un groupe alkyle ayant 1 à 6 atomes de carbone.

- 20 4. Antagoniste de leucotriène comprenant un dérivé du thiazole représenté par la formule suivante ou un sel pharmaceutiquement acceptable selon la revendication 2, comme ingrédient actif :



dans laquelle R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub> et R<sub>10</sub> sont définis comme dans la revendication 3.

- 35 5. Procédé de préparation d'un dérivé du thiazole représenté par la formule :



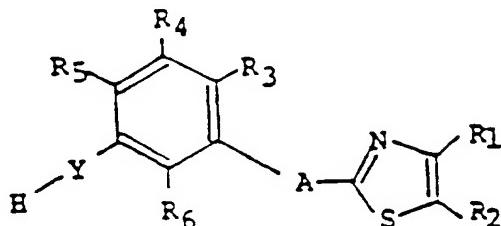
dans laquelle R<sub>1</sub> et R<sub>2</sub> représentent chacun indépendamment un atome d'hydrogène, un groupe alkyle ayant 1 à 8 atomes de carbone, un groupe alcoxycarbonyle inférieur ayant 2 à 4 atomes de carbone ou un groupe phényle qui est insubstitué ou substitué par un atome d'halogène, un groupe alcoxy inférieur ayant 1 à 3 atomes de carbone, un groupe alcoxycarbonyle inférieur ayant 2 à 4 atomes de carbone ou un groupe alkyle de 1 à 3 atomes de carbone, ou représentent ensemble un groupe tétraméthylène correspondant à un noyau cyclohexane fusionné ou un groupe butadiényle qui est insubstitué ou substitué par un atome d'halogène, un groupe alcoxy inférieur ayant 1 à 3 atomes de carbone, un groupe alcoxycarbonyle inférieur ayant 2 à 4 atomes de carbone ou un groupe alkyle ayant 1 à 3 atomes de carbone correspondant à un noyau benzène fusionné; R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> et R<sub>6</sub> représentent chacun indépendamment un atome d'hydrogène, un groupe hydroxyle, un groupe alcoxy inférieur ayant 1 à 3 atomes de carbone, un groupe alkyle ayant 1 à 3 atomes de carbone ou un atome d'halogène; R<sub>13</sub>

représente un groupe alkyle ayant 1 à 5 atomes de carbone;

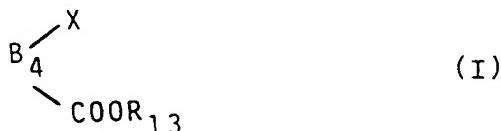
A est un groupe de liaison choisi dans le groupe constitué par -CH=CH-, -CH<sub>2</sub>CH<sub>2</sub>-, -OCH<sub>2</sub>-, -NHCH<sub>2</sub>-, -CONH-, -CH=CHCONH, et -CH<sub>2</sub>OCH<sub>2</sub>-;

Z représente -B<sub>4</sub> ou -B<sub>3</sub>-CO- où B<sub>4</sub> représente un groupe de liaison ayant 1 à 4 atomes de carbone, et B<sub>3</sub> représente une liaison directe ou un groupe de liaison ayant 1 à 3 atomes de carbone, avec la réserve que, quand Z = B<sub>3</sub>-CO- alors Y = NH; Y représente un oxygène ou -NH, ou ses sels pharmaceutiquement acceptables,

qui consiste à faire réagir un composé représenté par la formule :

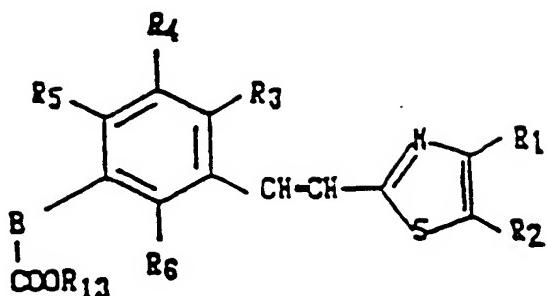


20 dans laquelle R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, A et Y sont les mêmes que ceux définis ci-dessus, avec un composé choisi dans le groupe des formules (I)-(K) suivantes :



45 dans lesquelles X est un atome d'halogène, B<sub>3</sub> et B<sub>4</sub> sont les mêmes que ceux définis ci-dessus, avec la réserve que B<sub>3</sub> n'est pas une liaison directe dans la formule (K), et (J) et (K) peuvent être le cas échéant soumis en outre à une hydrolyse pour obtenir un sel d'acide et (I) et (J) peuvent être le cas échéant soumis en outre à une estérification.

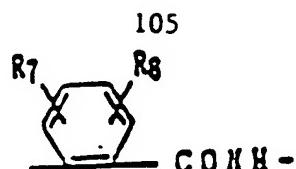
50 6. Procédé de préparation d'un dérivé du thiazole représenté par la formule :



dans laquelle R<sub>1</sub> et R<sub>2</sub> représentent chacun indépendamment un atome d'hydrogène, un groupe alkyle ayant 1 à 8 atomes de carbone, un groupe alcoxycarbonyle inférieur ayant 2 à 4 atomes de carbone ou un groupe phényle, ou représentent ensemble un groupe tétraméthylène correspondant à un noyau cyclohexane fusionné ou un groupe butadiénylène qui est insubstitué ou substitué par un atome d'halogène, un groupe alcoxy inférieur ayant 1 à 3 atomes de carbone, un groupe alcoxycarbonyle inférieur ayant 2 à 4 atomes de carbone ou un groupe alkyle ayant 1 à 3 atomes de carbone correspondant à un noyau benzène fusionné; R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> et R<sub>6</sub> représentent chacun indépendamment un atome d'hydrogène, un groupe hydroxyle, un groupe alcoxy inférieur ayant 1 à 3 atomes de carbone, un groupe alkyle ayant 1 à 3 atomes de carbone ou un atome d'halogène; R<sub>13</sub> représente un groupe alkyle ayant 1 à 5 atomes de carbone;

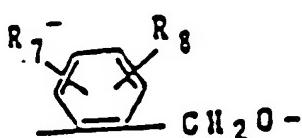
B est un groupe choisi dans le groupe constitué par :

- (CH<sub>2</sub>)<sub>n</sub>-CONH- où n est un entier de 0 à 3,
- (CH<sub>2</sub>)<sub>n</sub>-NH- où n est un entier de 1 à 4,
- (CH<sub>2</sub>)<sub>n</sub>-O- où n est un entier de 1 à 4,
- (CH<sub>2</sub>)<sub>n</sub>- où n est un entier de 2 à 5,



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dans laquelle R<sub>7</sub> et R<sub>8</sub> représentent chacun indépendamment un atome d'hydrogène ou un groupe alkyle ayant 1 à 3 atomes de carbone comme défini ci-dessus,



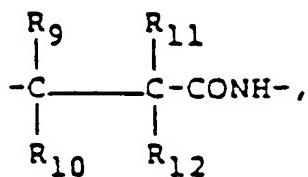
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dans laquelle R<sub>7</sub> et R<sub>8</sub> ont les mêmes significations que celles définies ci-dessus,

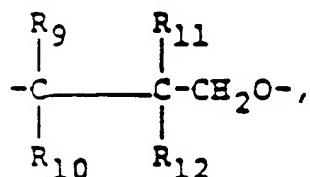


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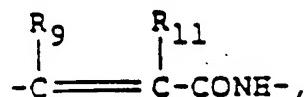
dans laquelle R<sub>7</sub> et R<sub>8</sub> ont les mêmes significations que celles définies ci-dessus,



10 dans laquelle  $\text{R}_9$ ,  $\text{R}_{10}$ ,  $\text{R}_{11}$  et  $\text{R}_{12}$  représentent chacun indépendamment un atome d'hydrogène, un groupe phényle ou un groupe alkyle ayant 1 à 6 atomes de carbone,

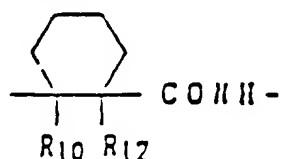


20 dans laquelle  $\text{R}_9$ ,  $\text{R}_{10}$ ,  $\text{R}_{11}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,



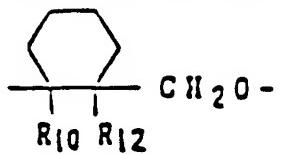
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dans laquelle  $\text{R}_9$  et  $\text{R}_{11}$  ont les mêmes significations que celles définies ci-dessus,



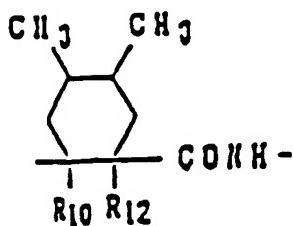
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dans laquelle  $\text{R}_{10}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,



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dans laquelle  $\text{R}_{10}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,

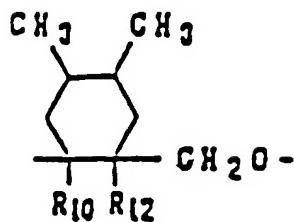


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dans laquelle  $\text{R}_{10}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,

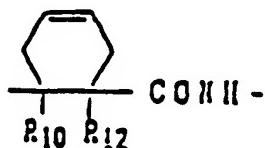
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dans laquelle  $\text{R}_{10}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,

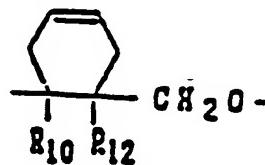
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dans laquelle  $\text{R}_{10}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,

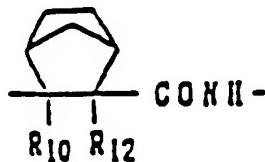
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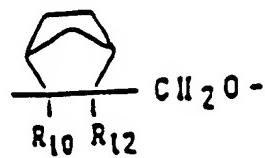
dans laquelle  $\text{R}_{10}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,

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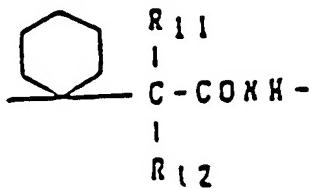
dans laquelle  $\text{R}_{10}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,



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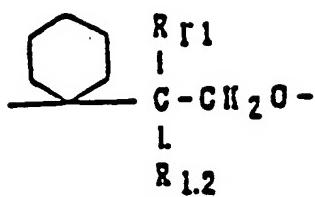
dans laquelle  $\text{R}_{10}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,

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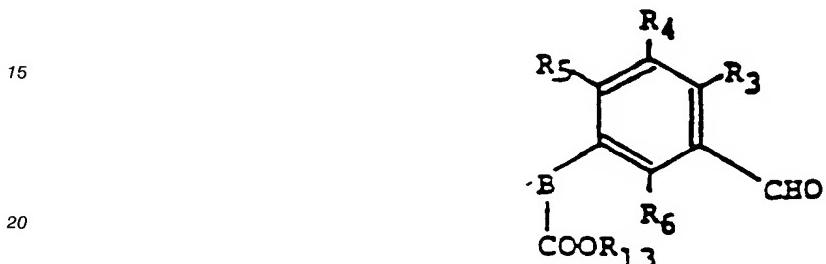


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dans laquelle  $\text{R}_{11}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus, et



10 dans laquelle  $\text{R}_{11}$  et  $\text{R}_{12}$  ont les mêmes significations que celles définies ci-dessus,  
ou un sel pharmaceutiquement acceptable, consistant à faire réagir un composé représenté par la  
formule :



25 dans laquelle  $\text{R}_3$ ,  $\text{R}_4$ ,  $\text{R}_5$ ,  $\text{R}_6$ ,  $\text{R}_{13}$  et  $\text{B}$  sont les mêmes que ceux définis ci-dessus, avec un composé  
représenté par la formule :



35 dans laquelle  $\text{R}_1$  et  $\text{R}_2$  sont les mêmes que ceux définis ci-dessus, et le cas échéant à soumettre en  
outre le produit ainsi obtenu à une hydrolyse pour obtenir un acide ou un sel.

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